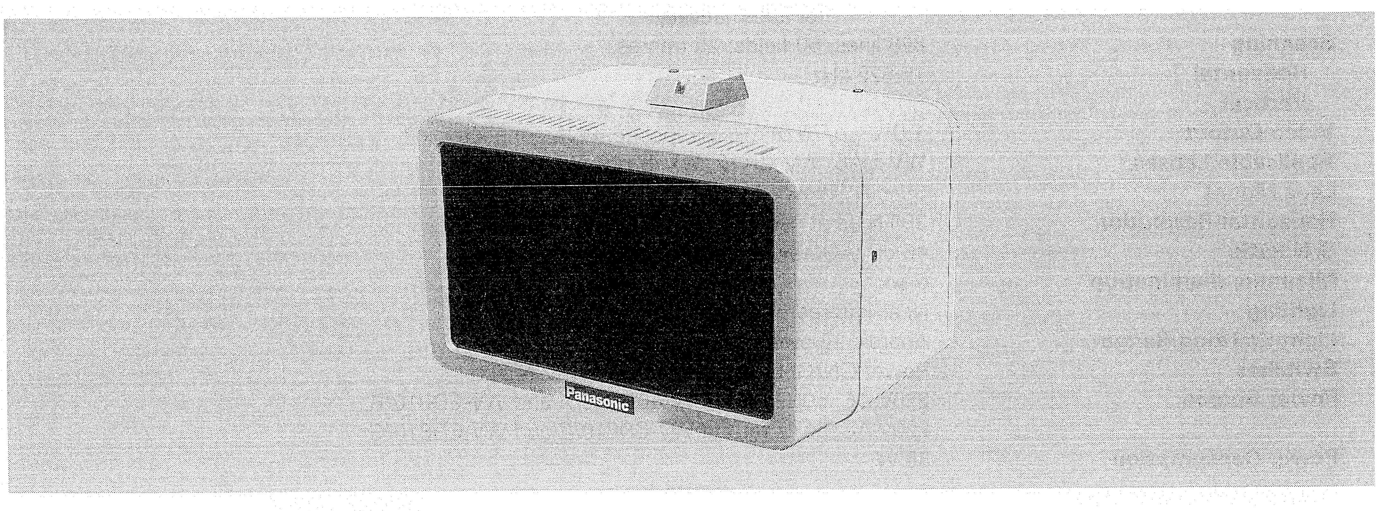
ORDER NO. AVS88032076
C8

Service Manual

Infrared Camera
WV-CD810



CONTENTS

SPECIFICATIONS 1
MAJOR OPERATING CONTROLS
AND THEIR FUNCTIONS 2
LENSES 3
CONNECTIONS 4
PARTICULARS ON INFRARED CAMERAS 4
CIRCUIT DESCRIPTION
1. Principle of Infrared Camera 5
2. CCD Board 7
3. Main Board 8
4. LED Board 16
5. Power Board 16
ADJUSTMENT PROCEDURE
1. Test Equipment Required 17
2. Disassembly Procedure for Adjustment 17
3. CCD Image Sensor Replacement 18
4. Connection and Setting Up for Adjustment 19
5. Adjustment Procedure 19
LOCATION OF TEST POINTS AND
ADJUSTMENT CONTROLS 23
CHIP COMPONENTS 24
APPEARANCE OF IC, TRANSISTOR AND DIODE 26
BLOCK DIAGRAM
MAIN BOARD 27
SCHEMATIC DIAGRAM
MAIN BOARD 29
LED BOARD 30
POWER BOARD 30
CONDUCTOR VIEW
MAIN BOARD 29
LED BOARD 30
POWER BOARD 30
WIRING DIAGRAM 31
EXPLODED VIEW/PACKAGING 32
REPLACEMENT PARTS LIST 33

Panasonic

Matsushita Electric Industrial Co., Ltd.
Central P.O. Box 288, Osaka 530-91, Japan

SPECIFICATIONS

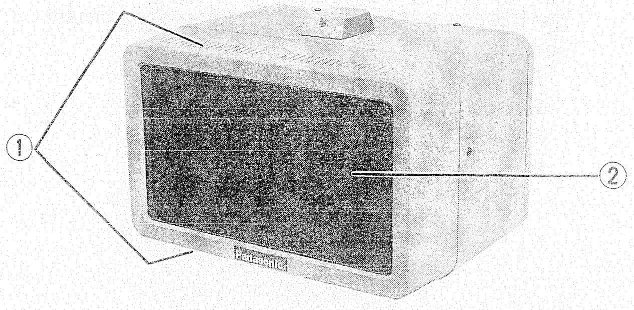
Pick-up Device	Interline transfer CCD with 500 (H) × 582 (V) pixels
Scanning Area	1/2 inch image size (6.4 mm (H) × 4.8 mm (V))
Synchronization	Internal or external, switchable automatically Internal: 2:1 interlace by built-in sync. generator or 2:1 interlace line-locked switchable External: Gen-locked by 1.0 Vp-p/75-ohm composite video signal with Hi-Z looping through or terminated with 75-ohm resistor automatically
Scanning	625 lines, 50 fields, 25 frames
Horizontal	15,625 kHz
Vertical	50 Hz
Video Output	1.0 Vp-p/75 ohms, composite, BNC connector x 1
Applicable Lenses	WV-LA6, WV-LA12, WV-LA18, WV-LA36
Lens Mount	Special Screw Mount
Horizontal Resolution	350 lines at center
S/N Ratio	46 dB (AGC switch set to OFF)
Minimum Illumination	0 lux
Lighting	Near-infrared LED (950 nm)
Light Emitting Range	Approx. 10 meters
Switches	Power ON/OFF, AGC ON/OFF, SYNC INT/LL
Power Source	240V AC, 50Hz for the WV-CD810/A and WV-CD810/B, 220V AC, 50Hz for the WV-CD810/C and WV-CD810/G
Power Consumption	35 W
Ambient Operating Temperature	−10° — +50°C
Dimensions	239 (W) × 170 (D) × 161 (H) mm
Weight	3.4 kg

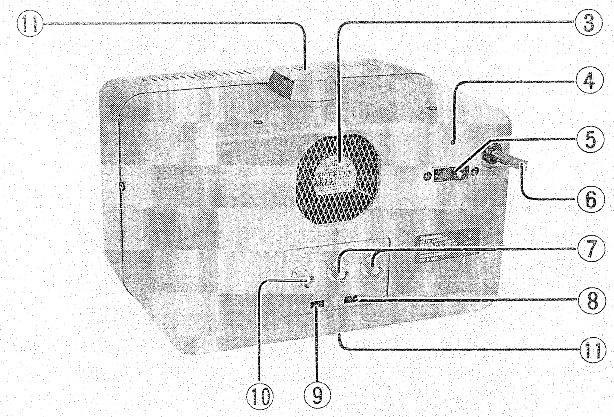
Weight and dimensions indicated are approximate.
Specifications are subject to change without notice.

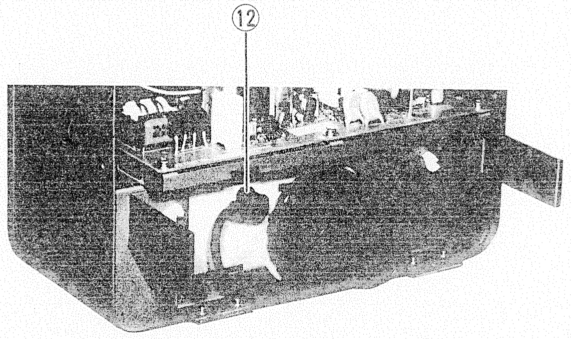
OPTIONAL ACCESSORIES

Lenses: WV-LA6
WV-LA12
WV-LA18
WV-LA36
Mounting Bracket: WV-831

MAJOR OPERATING CONTROLS AND THEIR FUNCTIONS







① **Ventilation Slits**

The air needed to ventilate the interior is taken in through these slits and is blown out, using the fan ③, at the rear.

An air filter element is installed inside the ventilation slits.

Note: 1. Do not block the ventilation slits or the air exhaust slits on the rear panel.
2. Clean the air filter at regular intervals.

② **Visible-light cut filter**

This filter lets infrared light pass through, cutting out any light visible to the human eye.

③ **Fan**

The fan is always operating while power is ON.

Note: 1. Do not block the air exhaust slits on the rear panel.
2. Keep a proper distance of at least 6 inches (15 cm) between the air exhaust outlet and the ceiling or wall.

④ **Power Indicator**

⑤ **Power ON/OFF Switch [ON/OFF]**

⑥ **Power Cord**

⑦ **Gen-lock Connector [GEN LOCK IN/OUT]**

In order to achieve external synchronization of the camera, a composite video signal (VS) can be supplied to the GEN LOCK IN connector. If no connection is made to the GEN LOCK OUT connector, the gen-lock input is automatically terminated with 75 ohms; at all other times the GEN LOCK IN/OUT connector is set in a high-impedance loop-through (Hi-Z) circuit.

⑧ **SYNC Selection Switch [INT/EXT, LL]**

This switch is used to select the camera synchronization mode.

INT/EXT: When no signal is supplied to the GEN-LOCK IN/OUT connector ⑦, the camera synchronization mode is set to internal 2:1 interlace.

Whenever a composite video signal is supplied to the GEN-LOCK IN/OUT connector ⑦, the camera synchronization mode is automatically set to external synchronization.

LL: If no signal is supplied to the GEN-LOCK IN/OUT connector ⑦, the camera synchronization mode is set to Line-Lock. Whenever a composite video signal is supplied to the GEN-LOCK IN/OUT connector ⑦, the camera synchronization mode is automatically set to external synchronization.

⑨ **AGC ON/OFF Switch [AGC ON/OFF]**

This switch is used to select the gain of the video amplifier as follows:

ON: When the lens iris is fully open at low light shooting, a clear picture is obtained by automatic increase of the gain.

OFF: A natural and low-noise picture is obtained at low light shooting.

⑩ **Video Output Connector [VIDEO]**

A composite video signal is provided at this connector.

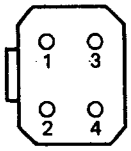
⑪ **Camera Mounting Screw Holes**

These threaded holes (1/4"-20) are used to mount the camera onto a mounting bracket or tripod.

⑫ **Lens Connector (4-pin) (inside camera)**

Use this connector to connect the lens for automatic light control.

Pin 1: Damper (−)
Pin 2: Damper (+)
Pin 3: Drive (+)
Pin 4: Drive (−)



LENSES

(1) Optional Lenses

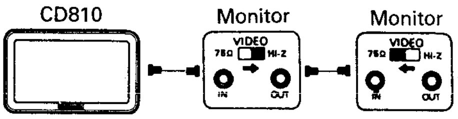
The following separately sold lenses can be used with this camera:

Models / Specifications		WV-LA6 (Wide-Angle)	WV-LA12 (Standard)	WV-LA18 (Telephoto)	WV-LA36 (Telephoto)
Focal Length		6 mm	12 mm	18 mm	36 mm
Maximum Aperture Ratio		1 : 1.4	1 : 1.4	1: 1.4	1 : 1.8
Automatic Light Compensation		1 : 2000	1 : 2000	1 : 4000	1 : 2400
Angular Field of View	H	54°75′	29°	20°36′	10°13′
	V	42°45′	21°59′	15°22′	7°39′
Picture Size		6.4 (H) × 4.8 (V) mm			
Minimum Focusing Distance		0.3 m	0.3 m	0.27 m	1 m
Mount		Screw Mount (1″-32 UN)			
Optional Filter Size		ø37.5 mm P = 0.5	ø37.5 mm P = 0.5	ø37.5 mm P = 0.5	ø37.5 mm P = 0.5
Weight		75 g	65 g	70 g	80 g
Dimensions		ø43 × 41 mm	ø43 × 41 mm	ø43 × 41 mm	ø43 × 41 mm

CONNECTIONS

Video Cable

1. Use a video monitor whose resolution is at least equal to that of the camera.
2. Terminate the camera output with a 75-ohm resistor at the furthest end of the cable run.
   - A. Use 75-ohm coaxial cable. (RG-59/U, RG-6/U, RG-11/U, RG-15/U)
   - B. Always set the last monitor's termination switch to 75 ohms and set the termination switches of intermediate monitors to HIGH (Hi-Z).



   - C. The maximum coaxial cable length that may be used between the camera and the monitor is as shown in Table 1. Since the cable quality varies among manufacturers, please ensure only the best quality is used in case maximum lengths are to be used.

Table 1

Type of coaxial cable		RG-59/U (3C-2V)	RG-6/U (5C-2V)	RG-11/U (7C-2V)	RG-15/U (10C-2V)
Recommended maximum cable length	(ft)	825	1650	1980	2640
	(m)	250	500	600	800

3. Wiring Precautions

- Do not bend the coaxial cable into a curve whose radius is smaller than 10 times the diameter of the cable.
- Never staple the cable — not even with circular staples. Mismatching will occur.
- Never crunch or pinch the cable.
  All or one of the above will affect the impedance of the cable, resulting in poor picture quality.

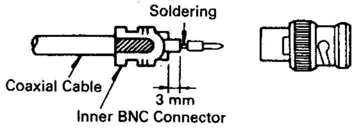
External Sync. Cable

- The camera can be sync-locked by a composite video signal or a black burst signal supplied to the GEN-LOCK IN//OUT connector ⑦.
- Use coaxial cable for the gen-lock signal as well as the video signal.

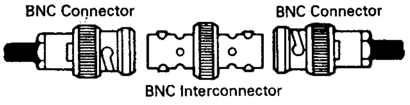
CABLE CONNECTOR INFORMATION

These connections should be made by qualified service personnel or the system installer.

- Coaxial Cable/BNC Connector



- Interconnection of BNC Coaxial Cable



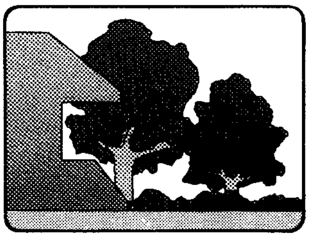
PARTICULARS ON INFRARED CAMERAS

This infrared cameras employs a CCD image sensor, which is highly sensitive to infrared light and a visible-light-cut filter. This assures that only infrared light can reach the lens. Additionally, the camera incorporates infrared LEDs emitting light of 950 nm ±50 nm as object/scene illumination. Picture quality is thus different from ordinary black-and-white cameras.

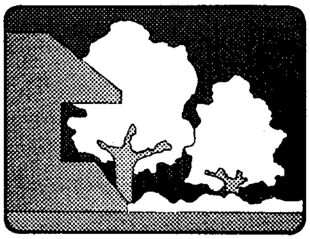
- **Contrast**
  Since the reflective ratio of an object differs when illumated with infrared light instead of visible light, the picture contrast becomes as follows:
  - Grass and leaves turn whitish.
  - Coatings cannot be discriminated between.

- **Smear**
  If the camera is aimed at spot lights or other light-reflecting objects, a vertical white stripe (smear) may appear and be more obvious than when using black-and-white cameras.

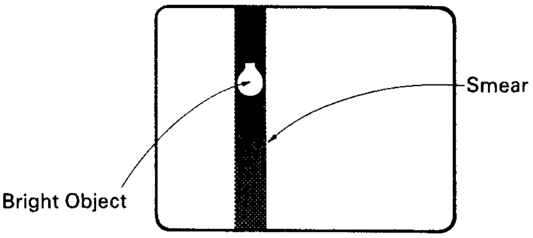
Daylight Picture



Ordinary Black-and-white Camera



Infrared Camera



CIRCUIT DESCRIPTION

1. Principle of Infrared Camera

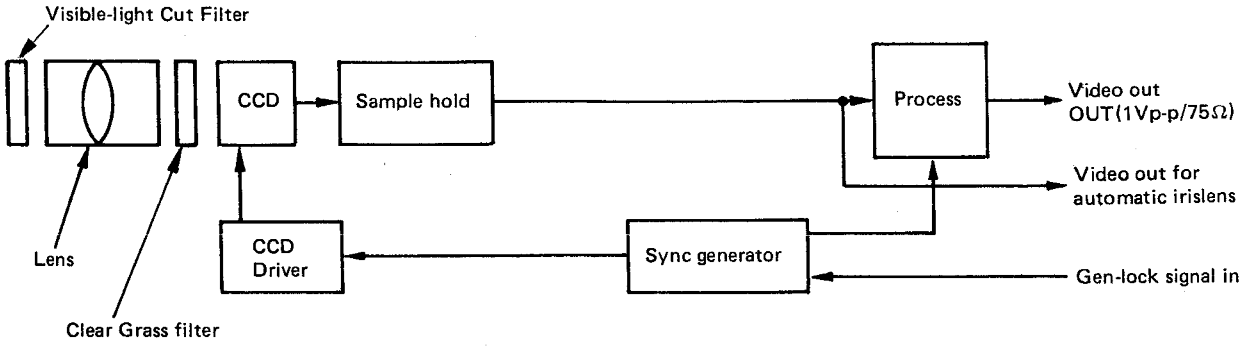

Visible-light Cut Filter
Lens
Clear Grass filter
CCD
Sample hold
CCD Driver
Sync generator
Process
Video out OUT(1Vp-p/75Ω)
Video out for automatic irislens
Gen-lock signal in

Fig. 1-1 Block Diagram of WV-CD810

The incoming light which passes through visible-light cut filter, the automatic iris control (AIC) lens and clear glass filter reaches the surface of the CCD (Charge Coupled Device) image sensor.

Visible-light cut filter

This infrared camera employs a CCD image sensor, which is highly sensitive to infrared light and a visible-light cut filter. This assures that only infrared light can reach the lens. Additionally, the camera incorporates infrared LEDs emitting light of 950nm ± 50nm as object/scene illumination.

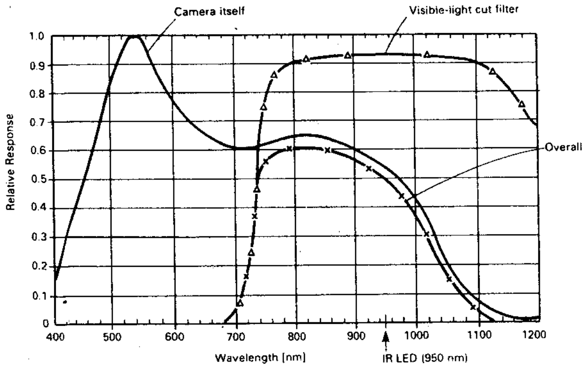


Fig. 1-2 Visible-light Cut Filter Response

CCD Image Sensor

The CCD image sensor used in camera has MOS type sensor, high sensitivity output amplifier and the interline system. Because of this, the CCD image sensor has low noise and high sensitivity characteristic.
The specifications of CCD image sensor YWICX031AL is as follows.

Specification of YWICX031AL

Type :	Interline type CCD image sensor
Unit cell size :	12.2 µm (H) x 8 µm (V)
Chip size :	8.1mm (H) x 6.4mm (V)
Number of element :	500(H) x 582(V)
Number of OB :	Left 2, Right 30 (H) Bottom 14 (V)
Scanning area :	6.4mm(H) x 4.8mm(V) 1/2 inch image size

The CCD image sensor has approximately 290,000 pcs of picture elements (500(H) x 582(V)), its scanning area 6.4mm(H) x 4.8mm(V) so that the 1/2 inches optics and lens can be used.
The CCD image sensor is mounted on dual in line package with 20 pins and has an optical window in front of the cell as shown in Fig. 1-3

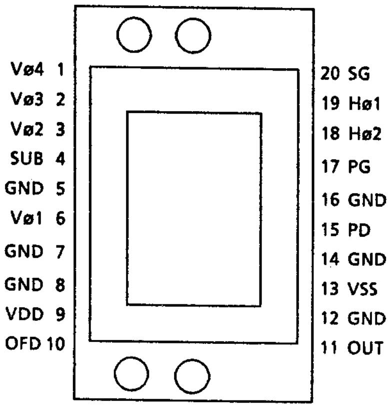

Vø4 1
Vø3 2
Vø2 3
SUB 4
GND 5
Vø1 6
GND 7
GND 8
VDD 9
OFD 10
20 SG
19 Hø1
18 Hø2
17 PG
16 GND
15 PD
14 GND
13 VSS
12 GND
11 OUT

Fig. 1-3 Appearance of CCD image sensor YWICX031AL

The pin identification of CCD image sensor YWICX031AL is as follows;

Pin No.	Name	Description
1	Vø4	V transfer pulse 4
2	Vø3	V transfer pulse 3
3	Vø2	V transfer pulse 2
4	SUB	Substrate (Ground)
5	GND	Ground
6	Vø1	V transfer pulse 1
7	GND	Ground
8	GND	Ground
9	VDD	Power source
10	OFD	Anti-blooming bias
11	OUT	Pre-video out
12	GND	Ground
13	VSS	Output amplifier gate bias
14	GND	Ground
15	PD	Pre-charge drain bias
16	GND	Ground
17	PG	Pre-charge pulse
18	Hø2	H transfer pulse 2
19	Hø1	H transfer pulse 1
20	SG	Sensor gate bias

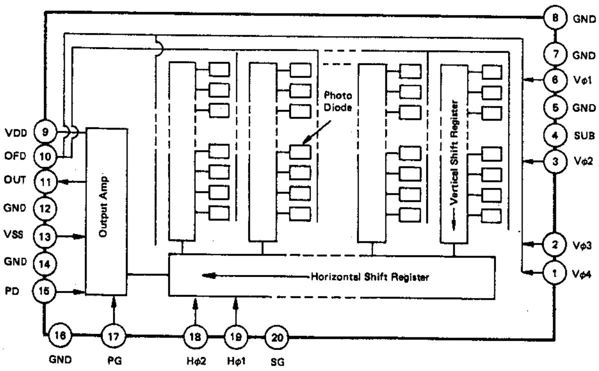

GND
GND
Vφ1
GND
SUB
Vφ2
Vφ3
Vφ4
VDD
OFD
OUT
GND
VSS
GND
PD
Output Amp
Photo Diode
Vertical Shift Register
Horizontal Shift Register
GND
PG
Hφ2
Hφ1
SG
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20

Fig. 1-4 CCD image sensor

CCD image sensor is made up of a simple MOS structure and consists of ;

(1) Photo-diode :	Generates charge packets corresponding to the incoming light intensity.
(2) Vertical shift Register :	Accumulated the charge packets from photo-diode and transfers them in the vertical direction.
(3) Horizontal shift Register :	Transfers charge packets in the horizontal direction to the output.
(4) Output section :	Outputs the signal transferred from the horizontal CCD sequentially.

When the incoming light reaches the photo-diode, the signal-charges are accumulated according to the intensity of light.
The accumulated signal-charges are sent to the transfer section of vertical shift register by supplying transfer pulse to read-out gate during vertical blanking periods.
The signal-charges sent to the transfer section are shifted from picture elements to picture elements by supplying transfer pulse to vertical shift register, and they are shifted to horizontal shift register.
The signal-charges are taken out from output amplifier during horizontal scanning periods.
Basic action of CCD image sensor is shown in Fig. 1-5.

INTERLINE-TRANSFER ORGANIZATION

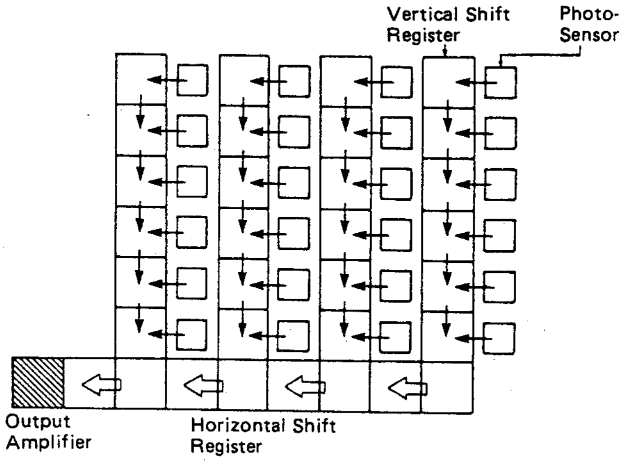

Vertical Shift Register
Photo-Sensor
Output Amplifier
Horizontal Shift Register

Fig. 1-5 Interline Transfer

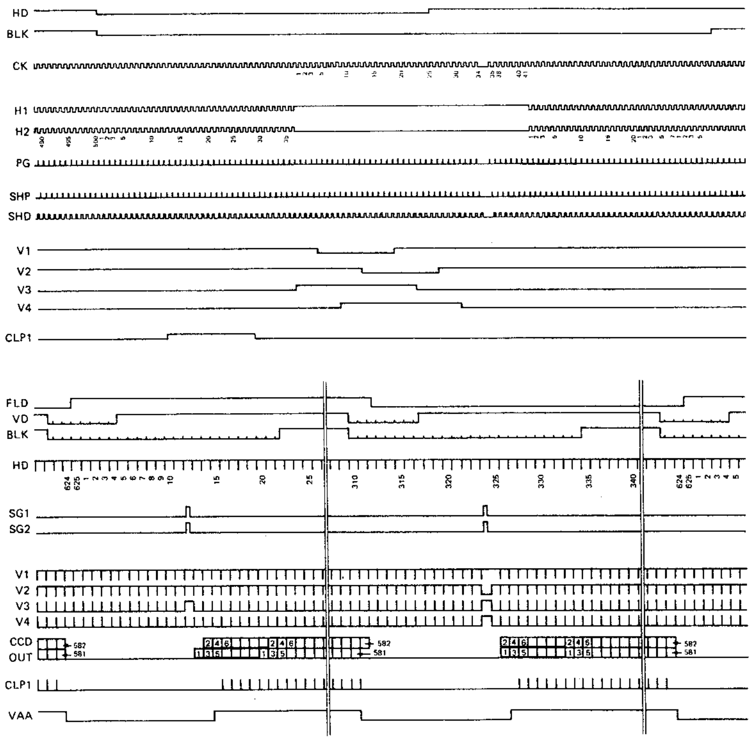


Fig. 2-1 CCD Drive Pulse Timing Chart

2. CCD Board

This board receives the pulses from the Main board and sends these pulses to the CCD image sensor in order to take out the prevideo signal.

The vertical (V) transfer pulse 1 (Vø1)(C) and 3 (Vø3)(E) from pins 9 and 8 of IC12 in the Main board are supplied to pins 17 and 18 of pulse amplifier IC2 and are amplified respectively.

The sensor gate pulses 1 (SG1)(A) and 2 (SG2)(B) from pins 11 and 10 of IC12 in the Main board and supplied to pins 15 and 16 of IC2 and the mixed signal obtained at pin 11 of IC2 is sent to pins 9 and 8 of IC2 and then mixed with amplified V transfer pulses 1 and 3 respectively.

The V transfer pulses 1 (Vø1)(G) and 3 (Vø3)(H) obtained at pins 10 and 7 of IC2 are fed to pins 6 and 2 of CCD image sensor IC1 respectively.

The V transfer pulses 2 (Vø2)(D) and 4 (Vø4)(F) from pins 5 and 4 of IC12 in the Main board are supplied through pins 19 and 22 of IC2 to amplifier inside IC2. The amplified pulses 2 (Vø2) and 4 (Vø4) obtained at pins 6 and 3 of IC2 are fed to pins 3 and 1 of CCD image sensor IC1 respectively.

The pin identification of pulse amplifier IC2 is as follows;

Pin No.	Pin Name	In/Out	Description
1	GND	—	Ground
2	NV	Out	Drive pulse
3	Vø4	Out	V transfer pulse 4
4	Vcc2-4	In	Middle bias
5	Vcc2-2	In	Middle bias
6	Vø2	Out	V transfer pulse 2
7	Vø3	Out	V transfer pulse 3
8	Vcc2-3	In	Middle bias
9	Vcc2-1	In	Middle bias
10	Vø1	Out	V transfer pulse 1
11	SG	Out	Sensor gate pulse
12	GND	—	Ground
13	Vcc3-1	In	Low bias
14	Vcc1	In	Power
15	XSG1	In	Sensor gate pulse 1
16	XSG2	In	Sensor gate pulse 2
17	XV1	In	V transfer pulse 1
18	XV3	In	V transfer pulse 3
19	XV2	In	V transfer pulse 2
20	H BLK	In	Power save
21	VAA	In	Power save
22	XV4	In	V transfer pulse 4
23	XNV	In	V transfer pulse 4
24	Vcc3-2	In	Low bias

The horizontal (H) transfer pulses 1 (Hø1) and 2 (Hø2) from pins 14 and 13 of IC12 in the Main board are supplied through inverter IC3 to pins 19 and 18 of CCD image sensor IC1 respectively.

The precharge pulse (PD) from pin 12 of IC12 in the Main board is supplied through inverter IC4 to pin 17 of CCD image sensor IC1.

When the incoming light reaches to the photo-diode, the signal-charges are accumulated corresponding to the incoming light intensity.

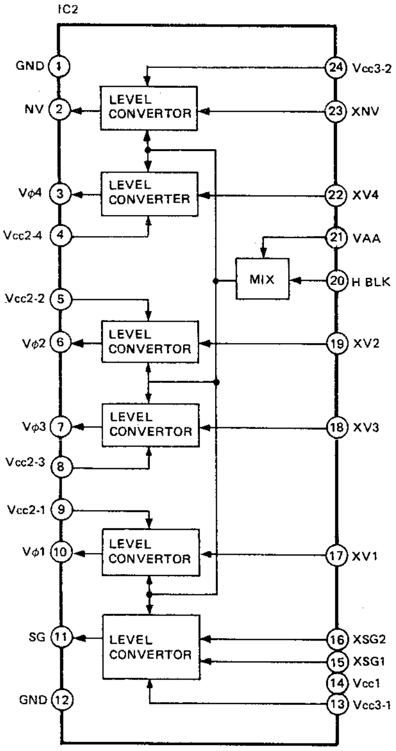

IC2
GND 1
NV 2
Vφ4 3
Vcc2-4 4
Vcc2-2 5
Vφ2 6
Vφ3 7
Vcc2-3 8
Vcc2-1 9
Vφ1 10
SG 11
GND 12
24 Vcc3-2
23 XNV
22 XV4
21 VAA
20 H BLK
19 XV2
18 XV3
17 XV1
16 XSG2
15 XSG1
14 Vcc1
13 Vcc3-1
LEVEL CONVERTOR
LEVEL CONVERTER
MIX

Fig. 2-2 Block Diagram of IC2

The accumulated signal charges are transferred to the vertical (V) shift register by the sensor gate pulse multiplexed to the V transfer pulses 1 (Vø1) and 3 (Vø3) supplied at pins 6 and 2 of CCD image sensor IC1 respectively.

The signal-charges are shifted to the horizontal (H) shift register every 1H period by V transfer pulses (Vø1, Vø2, Vø3, and Vø4).

The signal-charges are shifted to the output amplifier every 1V period by H transfer pulses 1(Hø1) and 2(Hø2).

The modulated prevideo signal obtained at pin 11 of CCD image sensor IC1 is fed to the sample hold circuit in the Main board through buffer Q3.

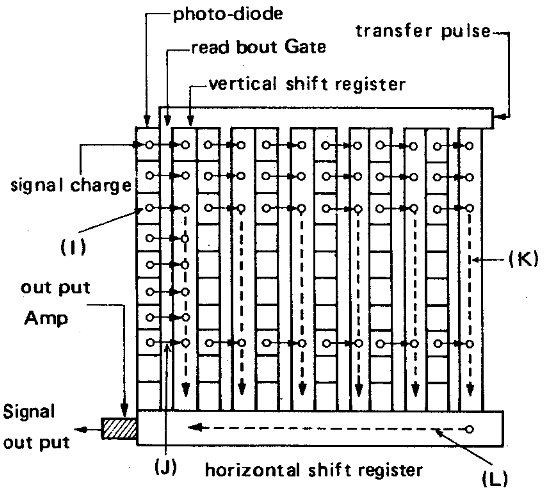


photo-diode
transfer pulse
read bout Gate
vertical shift register
signal charge
(I)
out put Amp
(K)
Signal out put
(J)
horizontal shift register
(L)

Fig. 2-3 Schematic Diagram of CCD Image Sensor

3. Main Board

3-1 CCD Drive Pulse Generator Circuit

This circuit receives vertical drive (VD) pulse and horizontal drive (HD) pulse from the sync generator circuit and clock (CK) pulse from 28MHz oscillator circuit, and generates CCD drive pulses and other pulses.

The pin identification of pulse generator IC12 is as follows;

Pin No.	Pin Name	In/Out	Description
1	SP1	—	Not used
2	SHD	Out	Data sample hold pulse
3	SHP	Out	Precharge sample hold pulse
4	XV4	Out	V transfer pulse 4
5	XV2	Out	V transfer pulse 2
6	Vss	—	Ground
7	HTSG	—	Ground
8	XV3	Out	V transfer pulse 3
9	XV1	Out	V transfer pulse 1
10	XSG2	Out	Sensor gate pulse 2
11	XSG1	Out	Sensor gate pulse 1
12	XPG	Out	Precharge pulse
13	XH2	Out	H transfer pulse 2
14	XH1	Out	H transfer pulse 1
15	A2	—	Not used
16	A1	—	Not used
17	A0	—	Not used
18	A3	—	Not used
19	VDD	—	Not used
20	A4	—	Not used
21	XSB	—	Not used
22	MODE3	—	Not used
23	PS	—	Not used
24	D4	—	Not used
25	D3	—	Not used
26	D2	—	Not used
27	D1	—	Not used
28	XVCT	—	Not used
29	MODE2	—	Not used
30	MODE1	—	Not used
31	Vss	—	Power
32	XCK	Out	Clock pulse
33	CK	In	Clock pulse
34	VD	In	Vertical drive pulse
35	HD	In	Horizontal drive pulse
36	CL	Out	Clock pulse
37	VAA	—	Not used
38	PBLK	—	Not used
39	ID	—	Not used
40	CLP3	—	Not used
41	CLP2	—	Not used
42	CLP1	—	Not used
43	VDD	—	Power
44	XDL2	—	Not used

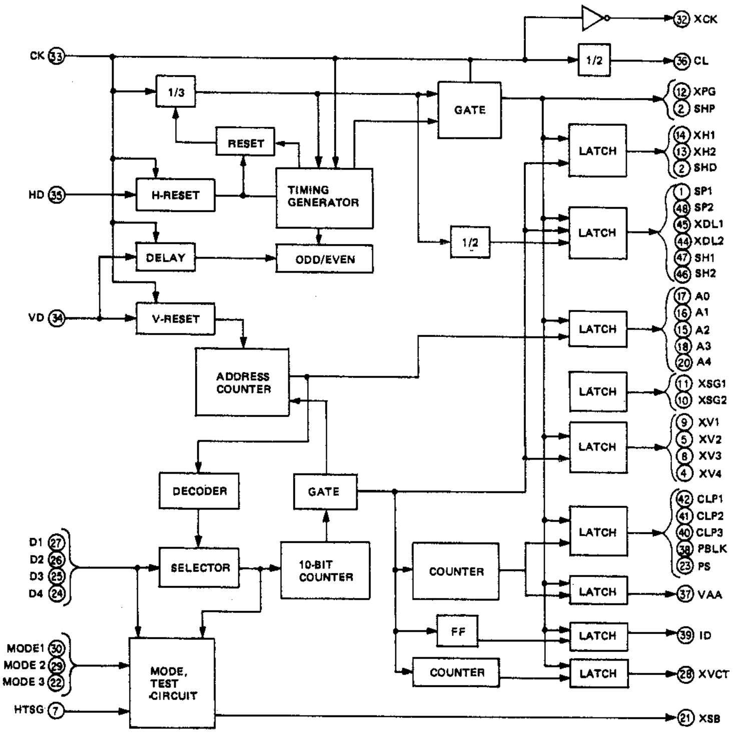

CK 33
HD 35
VD 34
D1 27
D2 26
D3 25
D4 24
MODE1 30
MODE 2 29
MODE 3 22
HTSG 7
1/3
RESET
H-RESET
TIMING GENERATOR
DELAY
ODD/EVEN
V-RESET
ADDRESS COUNTER
DECODER
GATE
SELECTOR
10-BIT COUNTER
MODE, TEST CIRCUIT
GATE
1/2
1/2
LATCH
COUNTER
FF
COUNTER
32 XCK
36 CL
12 XPG
2 SHP
14 XH1
13 XH2
2 SHD
1 SP1
48 SP2
45 XDL1
44 XDL2
47 SH1
46 SH2
17 A0
16 A1
15 A2
18 A3
20 A4
11 XSG1
10 XSG2
9 XV1
5 XV2
8 XV3
4 XV4
42 CLP1
41 CLP2
40 CLP3
38 PBLK
23 PS
37 VAA
39 ID
28 XVCT
21 XSB

Fig. 3-1 Block Diagram of IC12

45	XDL1	—	Not used
46	SH2	—	Not used
47	SH1	—	Not used
48	SP2	—	Not used

3-2 Sample Hold Circuit

This circuit receives the modulated prevideo signal from the CCD image sensor on the CCD board, and eliminate pulse and noise and generates a video signal.

The modulated prevideo signal (A) is fed from the CCD image sensor through amplifier Q14, buffer Q15 and pin 2 of IC1 to the clamp circuit inside IC1 where it is clamped by clamp DC which is supplied to pin 3 and modulated prevideo signal (A) is detected by the precharge sample hold pulse (C) fed through pin 4 and the precharge component (E) is detect and then sent to the sample hold circuit inside IC1 where the signal is detected and held by the data sample hold pulse (B) sent through pin 6 of IC1.

The noise which generated after data sample are excluded after data sample hold is no the precharge component (F).

Where is subtracted from the signal with precharge component (D). As a result, only the prevideo signal (G) excluding the precharge component is detected and obtained at pin 24 of IC1 is fed to amplifier Q16.

the amplified prevideo signal is fed to the clamp circuit Q17 where it is clamped by horizontal drive pulse which is supplied to the sync generator circuit.

The amplified prevideo signal is then sent to the signal processing circuit through low pass filter CF1 and buffer Q18.

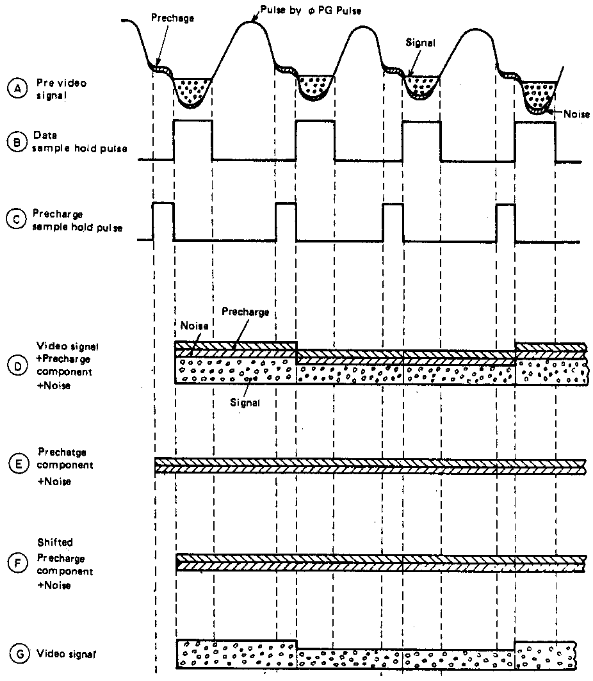

Prechage
Pulse by φ PG Pulse
Signal
Noise
Ⓐ Pre video signal
Ⓑ Data sample hold pulse
Ⓒ Precharge sample hold pulse
Precharge
Noise
Ⓓ Video signal +Precharge component +Noise
Signal
Ⓔ Prechatge component +Noise
Ⓕ Shifted Precharge component +Noise
Ⓖ Video signal

Fig. 3-2 Waveform of Sample Hold Circuit

3-3 Signal Processing Circuit

3-3-1 Optical Black (OB) Clamp Circuit

The prevideo signal is supplied through pin 5 of IC2 and amplifier circuit to optical black (OB) clamp circuit inside IC2. The OB places at the end of horizontal scanning area on the faceplate of CCD image sensor which cut off the incoming light.

When the CCD image sensor reads out the signal on the OB portion (A), the dark current of the CCD image sensor is produced and this signal portion (B) is clamped to a fixed DC potential, so that the black level is sensed.

In other words, the dark current level (B) of the prevideo signal (B) supplied to the clamp circuit inside IC2 is clamped by the power save pulse (PS) (C) separated from the multiplexed signal to power save (PS), horizontal drive (HD) and blanking (BL) pulse inside IC2.

The multiplexed signal of HD and BL pulse are generated and mixed in the sync generator circuit, and PS pulse is generated in the CCD drive pulse generator circuit and mixed in the sync generator circuit, and then they are fed to the pulse separator inside IC2 where they are separated.

The clamped prevideo signal is mixed with the BL pulse from the pulse separator and the noise during the blanking period is removed.

The mixed signal is fed to the gamma correction circuit and the iris control circuit through amplifier circuit inside IC2 and pin 24 of IC2.

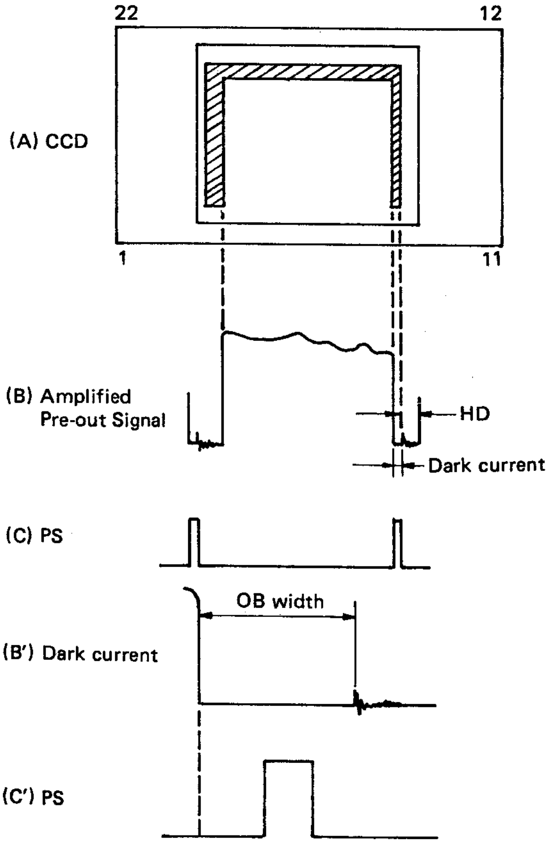


Fig. 3-3-1 OB Clamp Circuit

3-3-2 Gamma Correction Circuit

The prevideo signal is fed to the gamma correction circuit where the prevideo signal is corrected to the non-linear photoelectric conversion characteristic of cathode ray tube (CRT) and this circuit reproduces a linear picture of high fidelity on the monitor.

In order for a televised picture to have the same contrast gradation as the original scene, the system (including the CCD image sensor, signal processing inside camera and monitor, and CRT) gamma must be equal to 1.0.

The gamma characteristic of CCD image sensor is approx. 1.0 and gamma characteristic of the monitor CRT is approx. 2.2, so that the gamma correction circuit should be approx. 0.45, which makes the total gamma to be approx. 1.0.

The prevideo signal is fed to the gamma correction circuit and undergoes the gamma correction inside IC2.

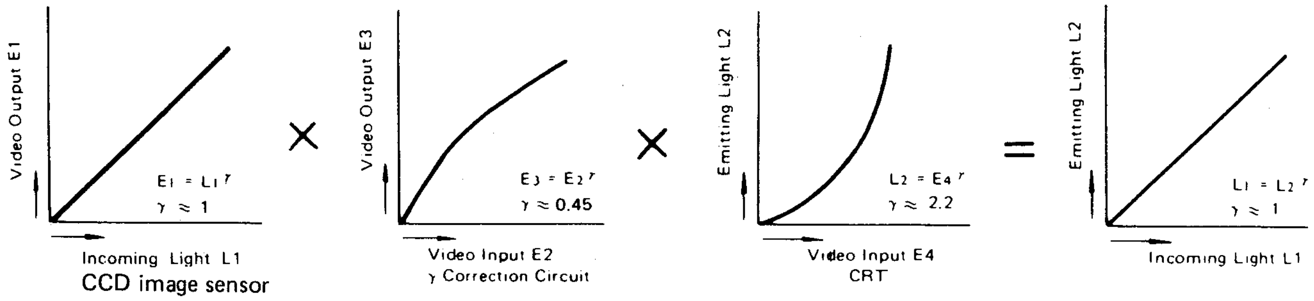


Fig. 3-3-2 Gamma Correction Circuit

3-3-3 Automatic Gain Control (AGC) Circuit

The prevideo signal from the gamma correction circuit in IC2 is fed through the AGC amplifier and amplifier to pin 8 of IC2. The prevideo signal is then applied to the AGC detect circuit where the video signal is modulated by the HD pulse from the pulse separator and modulated prevideo signal is made for detecting signal level corresponding to the center image.

The modulated prevideo signal is peakrectified in the AGC detect circuit and converted into DC voltage corresponding to the video signal level i.e., the incoming light intensity. This DC voltage is then fed through pins 17 and 16 of IC2 to the AGC control circuit where it is compared with the reference DC voltage.

When the AGC switch SW1 is set to ON position, low (L) level is fed to the base of AGC control Q19 and Q19 is turned OFF. The high (H) level obtained at the collector of Q19 is fed to control terminal pin 3 of IC4 and terminal pin 2 is connected to terminal pin 1.

The error DC voltage from the AGC control circuit is fed through pins 2 and 1 of IC4 and pin 7 of IC2 to the AGC amplifier to control prevideo gain.

AGC ON level is controlled by VR4 (AGC ON GAIN)

When the camera at low light condition, AGC control signal fed to the H aperture generator and V aperture suppress circuit through Q22 and pin 4 of IC3 and suppressed H and V aperture signal.

When the AGC switch SW1 is set to OFF position, H level is fed to control terminal pin 7 of IC4 and terminal pin 6 is connected to terminal pin 5.

The DC voltage from VR2 (AGC OFF GAIN) is fed through pins 6 and 5 of IC4 and pin 7 of IC2 to AGC amplifier to control prevideo gain.

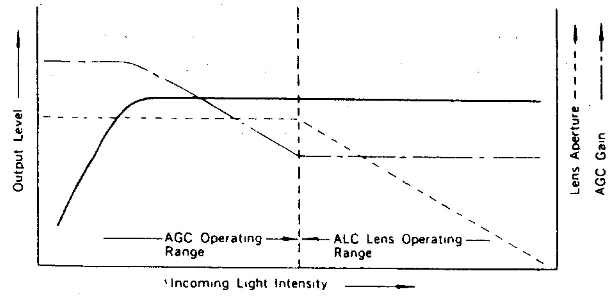


Fig. 3-3-3 AGC Operation

3-3-4 White Suppress Circuit

The amplified prevideo signal is fed from the AGC circuit through pin 13 of IC2 to trap CF1 which removes modulated component and prevideo signal is obtained.

The prevideo signal at in 8 of IC2 is fed to the white suppress circuit, where the high level of prevideo signal is slightly suppressed.

The suppressed prevideo signal obtained at pin 9 of IC2 is fed to the vertical edge circuit and black clamp DC detect circuit, and also suppressed prevideo signal is supplied to low pass filter CF2, where the frequency response of prevideo signal is limited to 5.5MHz, and the prevideo signal having high frequency response characteristic is generated.

The prevideo signal is then mixed with the vertical edge signal supplied from the vertical edge circuit. After its level is set by VR5 (VIDEO LEVEL), the prevideo signal is supplied to the horizontal aperture generator circuit in IC3.

3-3-5 Horizontal Aperture Generator Circuit

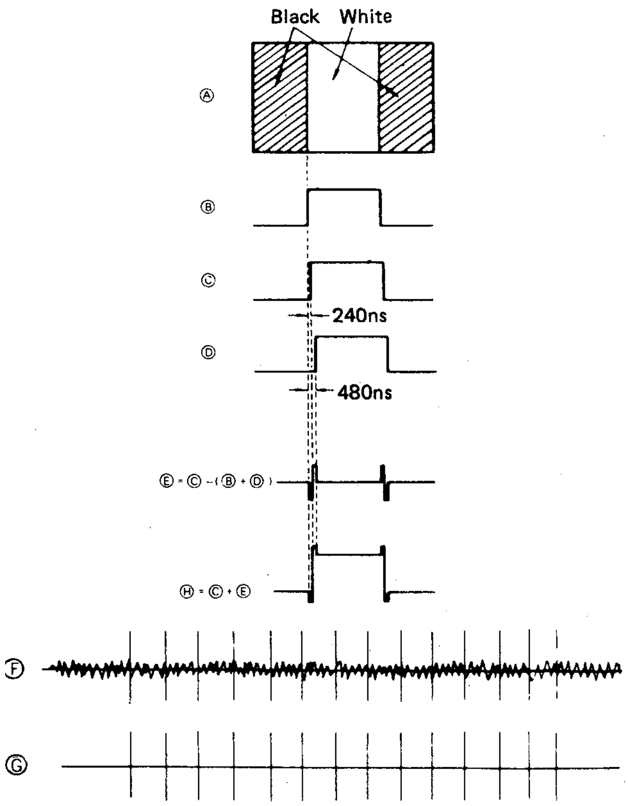


Fig. 3-3-5 Horizontal Aperture Signal

The gain controlled prevideo signal is fed to H.aperture generator circuit.

When the camera is aimed at an object (A) for example, the signal (B) pass through pin 1 of IC3, signal (C) delayed 240ns by delay line CF3 and amplified in the H aperture generator circuit and signal (D) which results from the delayed prevideo signal being reflected back through CF3 and delayed again (480ns) appear at the output of the H aperture generator circuit where they are mixed in fixed proportions to make up the H aperture signal (E).

The H aperture signal obtained in this way is applied through pin 23 of IC203, noise clipper of D1 and D2 and pin 4 of IC3, where the noise mixed in the H aperture signal (F) is removed (G) Q21 and Q20 is amplified H aperture signal.

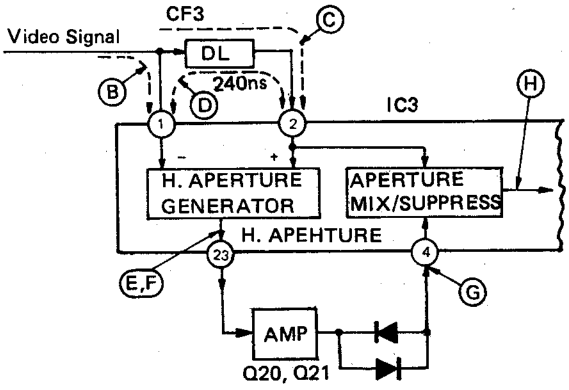

CF3
Video Signal
DL
240ns
Ⓑ
Ⓓ
Ⓒ
Ⓗ
IC3
1
2
-
+
H. APERTURE GENERATOR
APERTURE MIX/SUPPRESS
H. APEHTURE
23
4
E,F
Ⓖ
AMP
Q20, Q21

Fig. 3-3-6 Horizontal Aperture Circuit

3-3-6 Video Signal Processing Circuit

The horizontal aperture signal (A) from the H aperture generator circuit, vertical edge signal from the vertical edge circuit and prevideo signal (B) are mixed in the mix circuit in IC3.

The mixed signal (C) is forwarded through pins 6 and 7 of IC3 to the clamp circuit where the blanking level of the mixed signal is clamped by PS supplied from pulse separator in IC3.

The clamped signal is then sent to the blanking mix/high clip/low clip circuit, where it is mixed with the blanking pulse (D). The high clip circuit clips high level signal and low clip circuit clips low level signal portion of mixed signal (D) for setting the pedestal level (E).

The mixed signal of H.aperture and prevideo signal (E) which undergoes the high and low clip and is mixed with the sync signal (F) through pin 12 of IC3 forming a composite video signal (G). The video signal at pin 13 of IC3 is supplied to the video monitor through video output CN10 and connected coaxial cable.

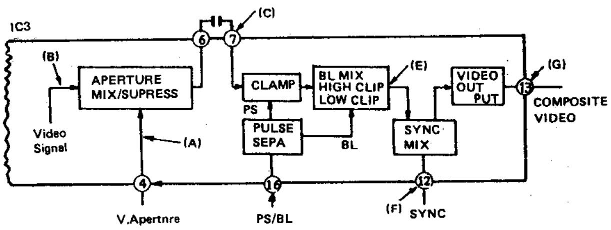

IC3
(B)
APERTURE MIX/SUPRESS
Video Signal
(A)
(C)
6
7
CLAMP
PS
PULSE SEPA
BL MIX HIGH CLIP LOW CLIP
BL
(E)
VIDEO OUT PUT
SYNC MIX
13
(G)
COMPOSITE VIDEO
4
16
12
V.Apertnre
PS/BL
(F) SYNC

Fig. 3-3-7 Video Signal Processing Circuit

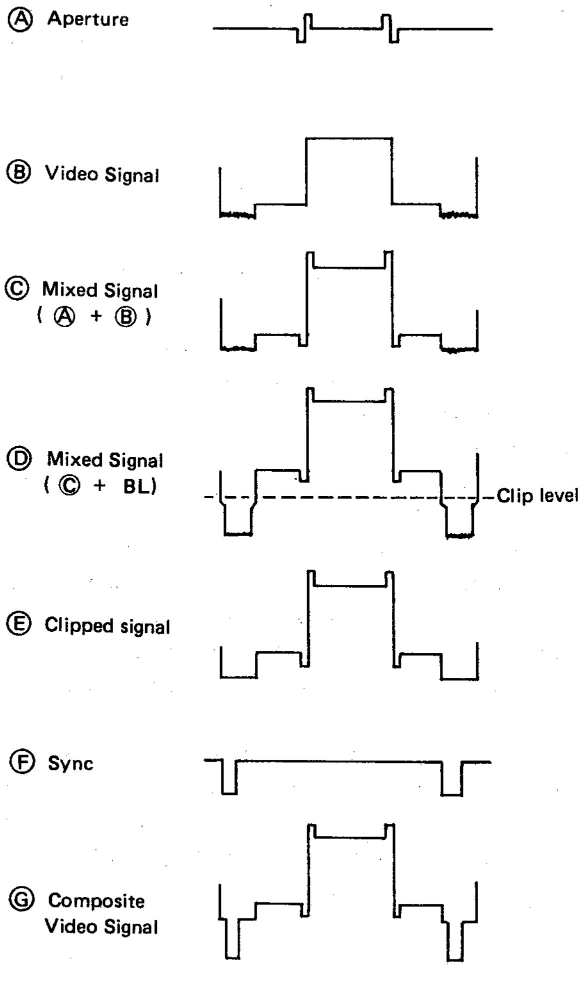


Fig. 3-3-8 Video Signal

3-4 Iris Control Circuit

This circuit receives the prevideo signal from the signal processing circuit and drives lens iris in order to keep video signal output level constant.

The prevideo signal is fed to gate Q23 and gated to the prevideo signal. The gated prevideo signal is then sent to control terminal pin 3 of IC8.

The prevideo signal is also fed to pin 2 of IC8. When the control terminal pin 3 is high level, the terminal pin 2 is connected to terminal pin 1, and detected signal is supplied to pin 2 of IC7 (a), VR8 (ALC LEVEL) sets the DC voltage of pin 3 of IC7 (a). The compared DC voltage obtained at pin 1 of IC7 (a) is fed to drive coil of lens iris in order to open/close lens iris.

The induced voltage (it is occurred by moving lens iris inside the damper coil.) is fed from lens damper coil to pin 5 of IC7 (b) and amplified by IC7 (b). Then amplified signal is fed from pin 7 of IC7 (b) to pin 2 of IC7 (a) to damp the lens iris hunting.

3-5 Black Clamp DC Detect Circuit

The prevideo signal from the signal processing circuit is fed to clamp circuit Q46 through amplifier circuit Q45, Q48 and Q49 where the blanking level of prevideo signal is clamped by blanking pulse supplied from the sync generator circuit.

The clamped signal is then fed to pin 3 of clamp DC detect IC5 through buffer Q47.

VR11 (BLACK CLAMP) sets the DC bias of IC5. The detected DC voltage obtained at pin 1 of IC5 is fed to the emitter of Q51.

The clamp pulse from the pulse generator IC19 is fed to the base of Q51 and sets the clamp level of clamp pulse.

The controlled clamp pulse obtained at the collector of Q51 is fed to the black clamp circuit Q60.

The prevideo signal from the sample hold circuit is fed to black clamp circuit Q60 where the black level of prevideo signal is clamped by controlled clamp pulse supplied from the collector of Q51. The clamped prevideo signal is then fed to the signal processing circuit.

3-6 Sync Separation Circuit

This circuit receives the composite video signal (VS) from the GEN-LOCK input connector in rear of camera. The sync signal separated from the composite video signal in this circuit is used as a V reset pulse (field rate pulse) for sync generator circuit and internal/external switching of the gen-lock mode.

When the composite video signal is input to the GEN-LOCK connector, the composite video signal is supplied to amplifier Q13 and Q12. The amplified composite video signal is fed to sync separator Q10 through buffer Q11 which separates the sync portion from the composite video signal.

The composite video signal is also fed to clamp circuit Q8 where the blanking level of composite video signal is clamped by separated composite video signal from the collector of sync separation Q10 through buffer Q9.

The clamped composite video signal is fed to amplifier Q7. The amplified composite video signal is then fed to other sync separator Q6 which separates the sync portion from the composite video signal.

The separated sync signal obtained at the collector of Q6 is fed to the V.reset detect circuit and sync generator circuit.

The V reset detect circuit generates the V reset pulse and external switching of the gen-lock mode. the separated sync signal from the collector of sync separator Q6 is fed to V reset detect Q4 and Q3 and detected V reset pulse obtained at the collector of Q3 is fed to the sync generator circuit.

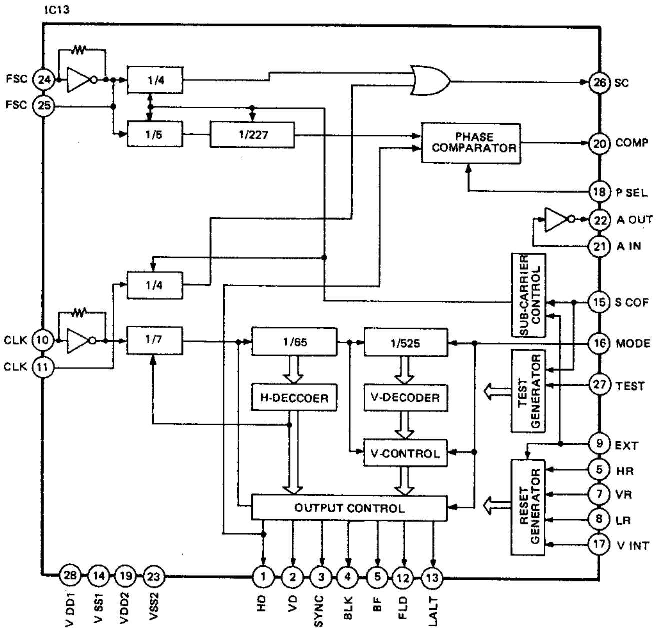

IC13
FSC 24
FSC 25
1/4
1/5
1/227
PHASE COMPARATOR
26 SC
20 COMP
18 P SEL
22 A OUT
21 A IN
SUB-CARRIER CONTROL
15 S COF
16 MODE
27 TEST
TEST GENERATOR
9 EXT
5 HR
7 VR
8 LR
17 V INT
RESET GENERATOR
1/4
CLK 10
CLK 11
1/7
1/65
1/525
H-DECCOER
V-DECODER
V-CONTROL
OUTPUT CONTROL
28 14 19 23
V DD1
V SS1
VDD2
VSS2
1 2 3 4 5 12 13
HD
VD
SYNC
BLK
BF
FLD
LALT

Fig. 3-8-1 Block Diagram of IC13

3-7 Sync Generator Circuit

3-7-1 Internal Sync Generator Circuit

This circuit generates the pulse necessary to produce the video signals when no external pulse (composite video signal) is fed to the camera.

When no external pulse is detected by the gen-lock select circuit, the EXT/INT control signal from gen-lock detect circuit is supplied to pin 9 of sync generator IC13 placing it in the internal sync mode.

The INT 28MHz oscillator is composed of X1, R158, C90, C92, CT1 (14MHz ADJ) and IC21 (d). The oscillated 28MHz is fed to terminal pin 2 of IC20. The low level from the gen-lock detect circuit is fed to pins 4 and 5 of NAND gate IC21 (b) and high level obtained at pin 6 of NAND gate IC21 (b) is fed to pin 10 of other NAND gate IC21 (d) and control terminal pin 3 of IC20. The terminal pin 2 of IC20 is connected to terminal pin 1 of IC20.

The oscillated 28MHz obtained at pin 1 of IC20 is fed to pin 33 of CCD drive pulse generator IC12. The oscillated 28MHz is then fed to 1/2 counter circuit inside IC12 and 14MLHz signal obtained at pin 36 of IC12 is fed to pins 10 and 24 of sync generator IC13 and generates pulse signals.

The pin identification of sync generator IC13 is as follows;

Pin No.	Pin Name	In/Out	Description
1	HD	Out	Horizontal drive pulse
2	VD	Out	Vertical drive pulse
3	SYNC	Out	Sync pulse
4	BLK	Out	Blanking pulse
5	BF	—	Not used
6	HR	—	Not used
7	VR	In	V reset pulse
8	LR	—	Not used
9	EXT	In	INT/EXT select
10	CLK	In	Clock pulse (14MHz)
11	CLK	Out	Clock pulse (14MHz)
12	FLD	—	Not used
13	LALT	—	Not used
14	Vss1	—	Ground
15	SCOF	In	Subcarrier signal
16	MODE	In	NTSC/PAL select
17	VINT	—	Not used
18	PSEL	—	Not used
19	VDD2	—	Not used
20	COMP	—	Not used
21	A IN	—	Not used
22	A OUT	—	Not used
23	Vss2	—	Not used
24	FSC	In	Clock pulse (14MHz)
25	FSC	—	Not used
26	SC	Out	Subcarrier signal
27	TEST	—	Not used
28	VDD1	—	Power (+5V)

The subcarrier signal obtained at pin 26 of IC13 is fed to the V edge circuit through buffer Q32.

The blanking pulse obtained at pin 4 of IC13 is fed to the black clamp DC detect circuit and signal processing circuit through inverter IC26 (c).

The sync pulse obtained at pin 3 of IC13 is fed to the signal processing circuit.

The vertical drive pulse obtained at pin 2 of IC13 is fed to the CCD drive pulse generator circuit.

The horizontal drive pulse obtained at pin 1 of IC13 is fed to the CCD drive pulse generator circuit, and sample hold circuit and H sync separation circuit through inverter IC26 (d).

The horizontal drive pulse is also fed to pin 3 of clamp pulse generator IC19 and generates clamp pulse. the clamp pulse obtained at pin 1 of IC19 is fed to signal processing circuit.

3-7-2 External Oscillator Circuit

When the composite video signal is input to the GEN-LOCK input connector, the external sync from sync separation circuit is supplied to sync generator IC13 through gen-lock detect circuit.

The EXT 28MHz oscillator composed of L20, C95, C97, C98, C99, R159, R160, R161 and D12 is a VCO (Voltage Controlled Oscillator) whose oscillation frequency is controlled by the phase of the sync signal separated from the composed video signal.

The separated sync signal is fed to pin 3 of H sync separator IC14 and separated H sync signal obtained at pin 1 of IC14 is fed to gen-lock detect circuit Q2 and Q1.

The high level obtained at gen-lock detect circuit is fed to pin 9 of sync generator IC13 and IC13 is external mode.

The H sync signal is also fed to pin 1 of phase comparator IC17 through switcher IC16 and inverter IC26 (a). The horizontal drive pulse from the pin 1 of IC13 is fed to pin 5 of pulse generator Ic14 through inverter IC26 (d) and generates wise horizontal drive pulse. The wide horizontal drive pulse obtained at pin 7 of IC14 is fed to pin 3 of phase comparator IC17 through switcher IC16.

The phase difference detected in IC17 is converted into a DC voltage. The variable capacitance diode D12 provides control over the oscillation frequency of VCO by means of this error voltage.

The oscillated EXT 28MHz is fed to pin 6 of IC20. the high level from the gen-lock detect circuit is sent to control terminal pin 7 of IC20. The terminal pin 6 of IC20 is connected to terminal pin 5 of IC20.

The oscillated EXT 28MHz obtained at pin 5 of IC20 is fed to pin 33 of CCD drive pulse generator IC12 and then fed to 1/2 counter circuit inside IC12. The 14MHz obtained at pin 36 of IC12 is fed to pins 10 and 24 of IC13 and IC12 generates pulse signals.

VR9 (H.PHASE) sets phase of wide horizontal drive pulse.

The V reset pulse from the V reset detect circuit is fed to pin 7 of IC13 through switcher IC16.

3-7-3 Line Lock Circuit

When the sync selector switch (SW2) on the Switch board set to "LL" (line lock) position, the high level from the Switch board is sent to control terminal pins 10 and 11 of IC16. The terminal pins 1 and 13 of IC16 are connected to terminal pins 15 and 14 of IC16.

The IC15 receives 50Hz vertical pulse from the Interface board and VR10 (LINE PHASE) sets phase of 50Hz vertical pulse. The controlled 50Hz vertical pulse obtained at pin 7 of IC15 is fed to phase comparator IC17 through switcher IC16 and inverter IC26 (a). the vertical drive pulse from pin 2 of IC13 is fed to phase comparator IC17 through switcher IC16.

These pulses are phase-compared inside IC17. The phase difference detected in IC17 is converted into a DC voltage. the DC voltage is then fed to 28MHz VCO circuit and pulses generated IC13 are synchronized with the connected main power line (50Hz).

3-8 Regulator Circuit

3-8-1 +9V Regulator Circuit

This circuit generates the regulated +9V DC.

The +9V DC voltage is generated by regulating +12V DC power using IC11.

the +9V DC obtained at pin 4 of IC11 is fed to other circuit.

VR4 (+9V ADJ) sets +9V DC voltage.

3-8-2 +5V Regulator circuit

This circuit generates the regulated +5V DC.

The +5V DC voltage is generated by regulating +9V DC power using IC10 (a).

The output voltage of IC10 (a) is supplied to pin 2 of IC10 (a) to form a feedback loop, thus stabilizing the output voltage.

The +5V DC obtained at pin 1 of IC10 (a) is fed to other circuit.

3-8-3 +1.8V Regulator Circuit

This circuit generates the regulated +1.8V DC.

The +1.8V DC voltage is generated by regulating +5V DC power using IC10 (b).

The output voltage of IC10 (b) is supplied to pin 6 of IC10 (b) to form a feed back loop, thus stabilizing the output voltage.

The +1.8V DC obtained at pin 7 of IC10 (b) is fed to other circuits.

3-8-4 + 15V Regulator Circuit

This circuit generated + 15V DC.
The horizontal drive pulse from the sync generator circuit is supplied through pulse driver Q29 and Q30 to primary winding of transformer T1 to step up the horizontal drive pulse to the necessary level.
The boosted pulses obtained at the secondary winding of T1 is rectified by D5 to generate + 15V DC voltage.
This voltage is supplied to the CCD board.

4. LED Board

This board receive the + 12V and generates the power of LEDs.
The reference voltage for pin 2 of IC1 is obtained by dividing the + 12V using R4 and R3.
The control voltage for pin 3 of IC1 is obtained by dividing the + 12V using R2 and R1. R1 is a temperature detect sensor.
When the LED board is warmed up, the control voltage at pin 3 of IC is decreased and output voltage is also decreased. As a result, the power of LED can not supply from power control transistor.

5. Power Board

This circuit receives main power 220/240V AC 50Hz and generates + 12V DC voltage.
The + 12V DC voltage is supplied to other board for generates + 5V, + 15V and + 9V.

ADJUSTMENT PROCEDURE

1. Test Equipment Required

The following test equipment is required for adjustment of infrared camera WV-CD810.

- Oscilloscope (30MHz band width)
- Digital voltmeter (DVM)
- Frequency counter
- Underscanned black and white video monitor
- Lens : Automatic iris control lens such as WV-LA12 or WV-LA18
- Lighting (140 footcandles (1400 lux), 3200°K)
- Lightmeter
- Logarithmic gray scale chart (Part No. YWV2310RB99)

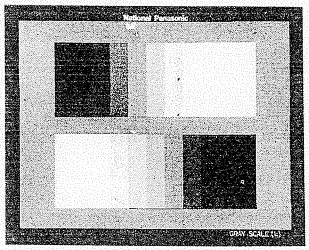

National Panasonic
GRAY SCALE (L)

Fig. 1-1

2. Disassembly Procedure for Adjustment

- Remove the eight screws holding the front cover and fold down the front cover towards the front of camera. (Fig. 2-1)

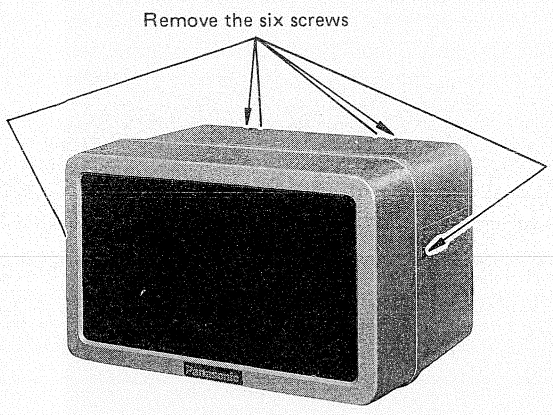

Remove the six screws
Panasonic

Fig. 2-1

- Remove the two screws holding the LED board and visible-light cut filter.
- Fold down the LED board and towards the front of the camera. (Fig. 2-2)

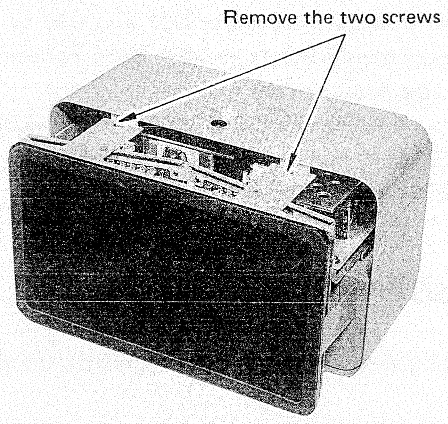

Remove the two screws

Fig. 2-2

- Disconnect BI1 and BI2 on the Power board. (Fig. 2-3)

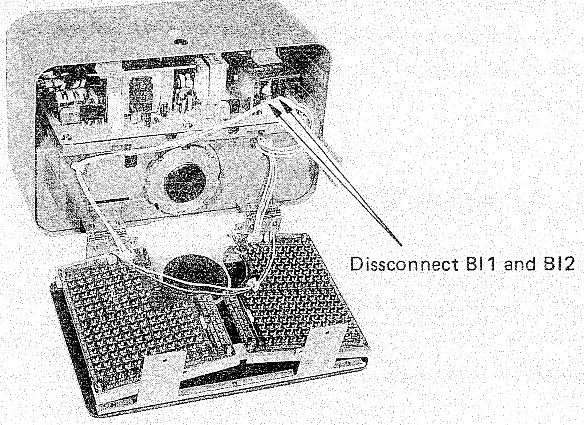

Dissconnect BI1 and BI2

Fig. 2-3

- Remove the four screws holding the Main board and Power board, then remove the Main board and Power board from the camera by pulling them. (Fig. 2-4)

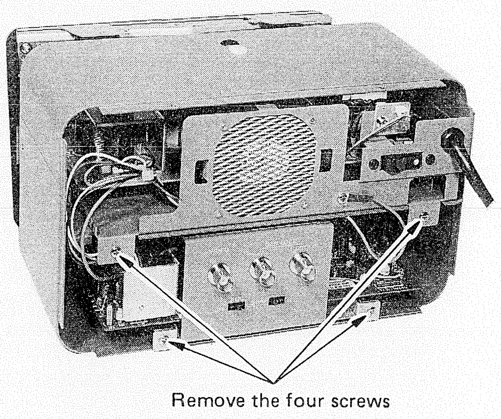

Remove the four screws

Fig. 2-4

3. CCD Image Sensor Replacement

- Disassembling the camera while referring to section 2. Disassembling Procedure for Adjustment on page 17.
- Remove the four screws holding the CCD board and remove the CCD board from the Main board angle. (Fig. 3-1)

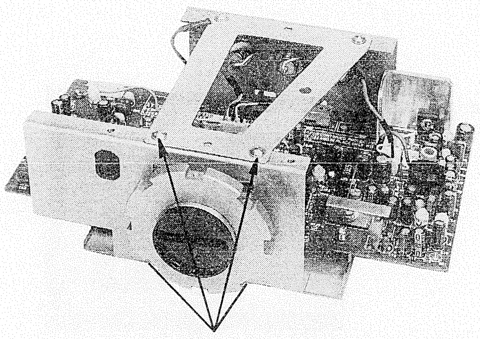

Remove the four screws

Fig. 3-1

- Disconnect CN1, CN2, CN3 and CN4 from the Main board. (Fig. 3-2)

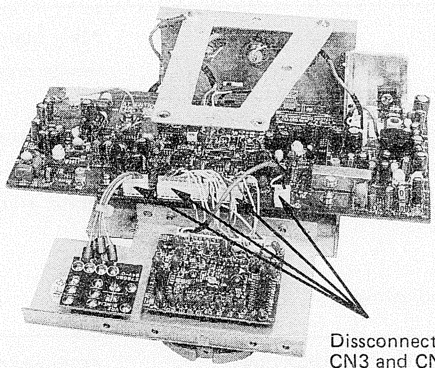

Dissconnect CN1, CN2,
CN3 and CN4

Fig. 3-2

- Remove the two screws holding the CCD board and remove the CCD board.
- Unsolder the CCD pins and remove the CCD Image sensor from the CCD board. (Fig. 3-3)

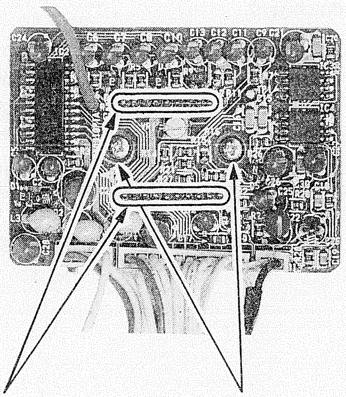

Unsolder the CCD pins
Remove the two screww

Fig. 3-3

- Remove the one screw holding focusing ring and remove focusing ring. (Fig. 3-4)

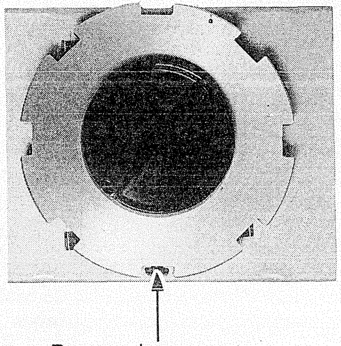

Remove the one screws

Fig. 3-4

- Remove the four screws holding the lens mounting bracket and remove the lens mounting bracket together with clear glass filter assembly and spring plates. (Fig. 3-5)

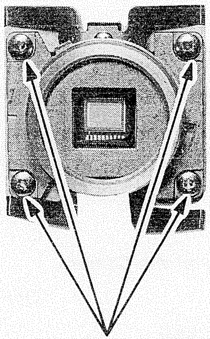

Remove the four screws

Fig. 3-5

- Clean the faceplate of new CCD with the lens cleaning tissue or cloth. (Fig. 3-6)

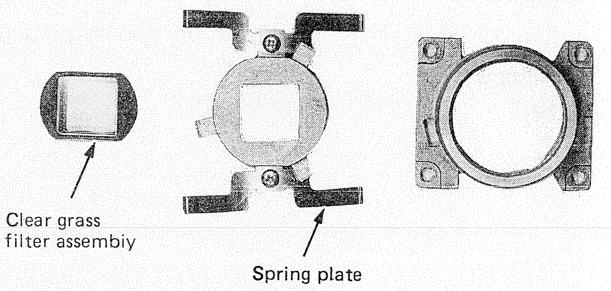

Clear grass
filter assembiy
Spring plate

Fig. 3-6

- Reassemble the camera by reverse procedure of disassembling

4. Connection and Setting Up for Adjustment

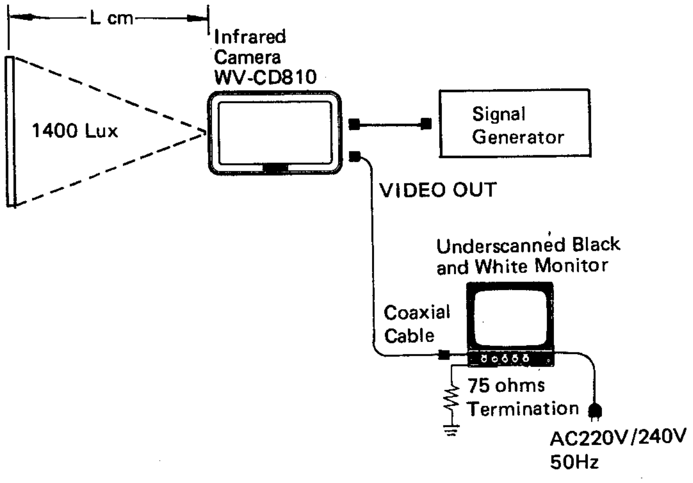

L cm
Infrared Camera WV-CD810
1400 Lux
Signal Generator
VIDEO OUT
Underscanned Black and White Monitor
Coaxial Cable
75 ohms Termination
AC220V/240V 50Hz

Fig. 4-1

Connection

- Connect the VIDEO output connector on the rear of camera to the VIDEO input connector of underscanned black and white monitor using coaxial cable.
- Terminate the VIDEO input of underscanned black and white monitor with 75 ohms.

Position of Switches on the Camera

AGC Switch (SW1 on the Main board)	OFF position
Sync Selector Switch (SW2 on the Main board)	INT/EXT position

Disassembling

- Disassembling the camera while referring to Section 2 "Disassembly Procedure for Adjustment" on page17.

Set-up

- Turn ON the camera for at least 30 minutes prior to adjustment.
- Light : 600 lux incident, 1950°K

5. Adjustment Procedure

- Refer to page 23 for the LOCATION OF TEST POINTS AND ADJUSTING CONTROLS.

  Caution : Aim the camera at the logarithmic gray scale chart during the adjustment so that the chart fully occupies the raster of the underscanned black and white monitor.

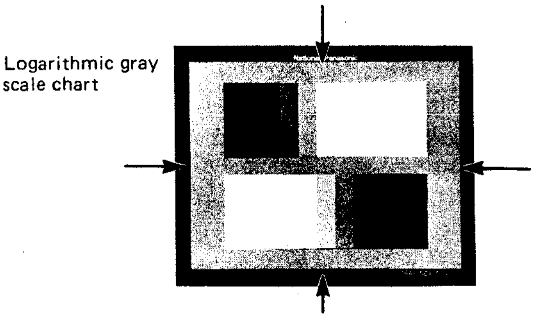

Logarithmic gray scale chart

Fig. 5-1

(1) +12V adjustment

Test point:	Pin 1 of CN6	Main board
Adjust :	R22 (+12V ADJ)	Power board

- Connect the digital voltmeter to Pin 1 of CN6 on the Main board.
- Adjust R22 (+12V ADJ) on the Power board for +12V.

(2) +9V adjustment

Test point:	TP9 (+9V)	Main board
Adjust:	VR4 (+9V ADJ)	Main board

- Connect the digital voltmeter to TP9 (+9V) on the Main board.
- Adjust VR4 (+9V ADJ) for +9V ± 0.02V.

(3) 14MHz adjustment

Test point:	TP10 (14MHz)	Main board
Adjust:	CT1 (14MHz ADJ)	Main board

- Connect the frequency counter to TP10 (14MHz) on the Main board.
- Adjust CT1 (14MHz ADJ) for 14.1875MHz ± 4KHz.

(4) EXT VCO adjustment

Test points:	TP11 (EXT VCO)	Main board
Adjust :	L20 (EXT VCO)	Main board

- Supply the composite video signal from the signal generator to the GEN-LOCK input connector on the rear of the camera.
- Connect the digital voltmeter to TP11 (EXT VCO) on the Main board.
- Adjust L20 (EXT VCO) for +3.0V ± 0.1V.

(5) Gen-lock H phase adjustment

Test points:	TP5 (VIDEO)	Main board
	CN10 GEN-LOCK INPUT Connector	
Adjust :	VR9 (H.PHASE)	Main board

- Keep the composite video signal from the signal generator to the GEN-LOCK input connector on the rear of the camera.
- Connect oscilloscope to TP5 (VIDEO) on the Main board and CN10 GEN-LOCK input connector.
- Trigger the oscilloscope at H.rate. (Use TP20 (HD) on the Main board)
- Expand the H sync period on the oscilloscope.
- Confirm that the sync of gen-lock signal is CN10 (GEN-LOCK) leads by more than 0.5 µsec and lugs more than 0.5 µsec sync signal at TP5 (VIDEO) as VR9 (H.PHASE) is turned through its range. (Fig. 5-2)

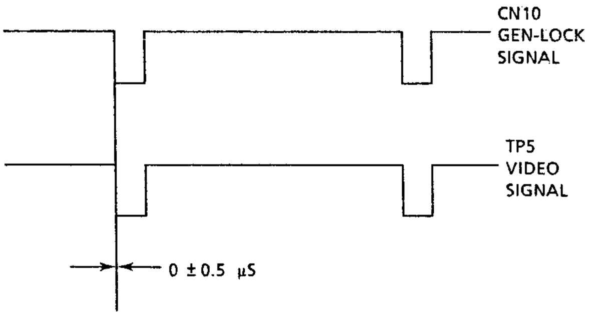


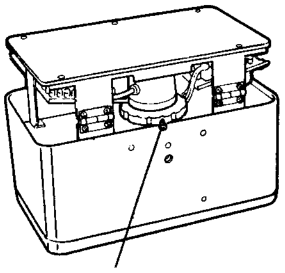
Fig. 5-2

- After confirming the above step, adjust VR9 so that the leading edges of both sync signals are coincident.

(6) Back focus adjustment

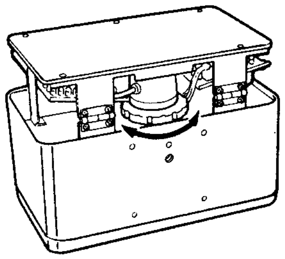
Adjust :	Flange-back adjustment ring
Observe :	Black and white monitor

- Aim the camera at an object which is illuminated approx. 10 footcandles (100 lux) and further than 10 meters.
- Set the lens focus ring to ∞ position.
- Remove the flange-back fixing screw (ø3 mm X 12 mm, binding head screw).(Fig 5-3-1)



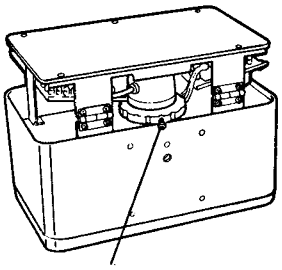
(Fig 5-3-1)

- Turn the flange-back adjustment ring for proper forcusing.(Fig 5-3-2)



(Fig 5-3-2)

- Fix the flange-back adjustment ring using one of the eight screw holes on the ring.(Fig 5-3-3)



(Fig 5-3-3)

(7) OFD adjustment

Test point :	TP1 (OFD)	CCD board
Adjust :	VR1 (OFD BIAS)	CCD board

- Connect the digital voltmeter to TP1 (OFD) on the LCCD baord.
- Adjust IVR1 (OFD BIAS) so that the voltage at TP1 is equal to AV. (See Note)

  Note : The value of OFD voltage is shown on the CCD Image sensor.

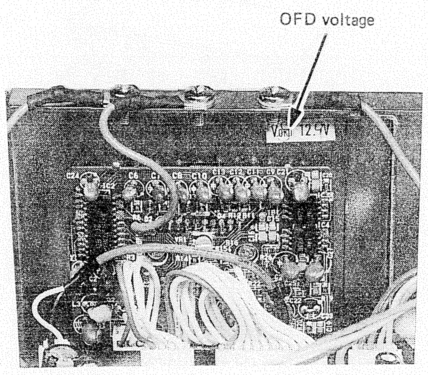


Fig. 5-4

(8) Automatic iris level adjustment

Test point :	TP4 (ALC)	Main board
Adjust :	VR8 (ALC LEVEL)	Main board

- Aim the camera at the logarithmic gray scale chart.
- Connect the oscilloscope to TP4 (ALC) on the Main board.
- Trigger the oscilloscope at H rate. (Use TP20 (HD) on the Main board.)
- Adjust VR8 (ALC LEVEL) for 0.5V ± 0.03V from the blanking level to the top step of the gray scale waveform. (Fig. 5-5)

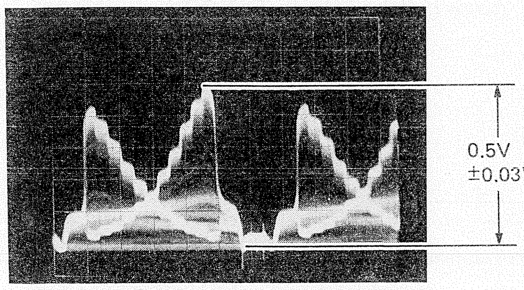


Fig. 5-5

(9) AGC gain adjustment

Test point :	TP3 (AGC)	Main board
Adjusts :	VR2 (MAN GAIN)	Main board
	VR3 (AGC SET)	Main board

- Aim the camera at the logarithmic gray scale chart.
- Set the SW1 (AGC ON/OFF SWITCH) on the Switch board to ON position.
- Connect the oscilloscope to TP3 (AGC) on the Main board.
- Trigger the oscilloscope at H rate. (Use TP20 (HD) on the Main board.)
- Adjust VR3 (AGC SET) for 0.4V ± 0.03V from the blanking level to the top step of the gray scale waveform. (Fig. 5-6)

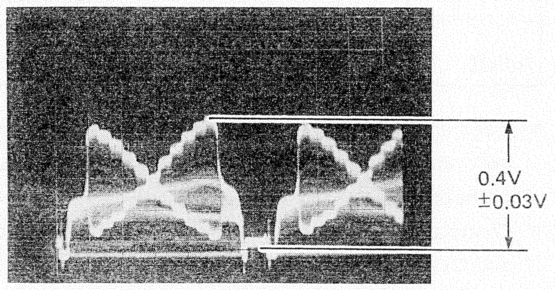


Fig. 5-6

- Set the SW1 on the Switch board to OFF position.
- Adjust VR2 (MAN GAIN) for 0.4V ± 0.03V from the blanking level to the top step of the gray scale waveform.

(10) Video signal adjustment

Test point :	TP5 (VIDEO)	Main board
Adjusts :	VR11 (BLACK CLAMP)	Main board
	VR5 (VIDEO LEVEL)	Main board

- Cap on the lens.
- Connect the oscilloscope to TP5 (VIDEO) on the Main board.
- Trigger the oscilloscope at H rate. (Use TP20 (HD) on the Main board.)
- Adjust VR11 (BLACK CLAMP) so that the pedestal level of video signal waveform becomes 0.1V. (Fig. 5-7)

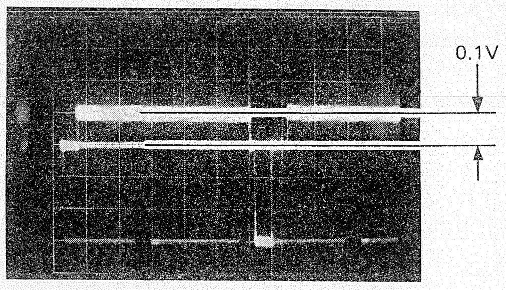


Fig. 5-7

- Remove cap from the lens.
- Aim the camera at the logarithmic gray scale chart.
- Adjust VR5 (VIDEO LEVEL) for 0.714V ± 0.03V from the blanking level to the top step of the gray scale waveform. (Fig. 5-8)

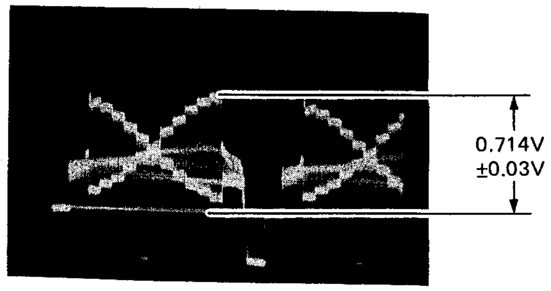


Fig. 5-8

(11) Line-lock vertical phase adjustment

Test point :	TP5 (VIDEO) Power line	Main board
Adjust :	VR10 (LINE PHASE)	Main board

- Connect the oscilloscope to TP5 (VIDEO) on the Main board and power line.
- Trigger the oscilloscope at V rate. (Use TP21 (VD) on the Main board.)
- Set SW2 (SYNC SELECTOR SWITCH) on the Switch board to LL position.
- Adjust VR10 (LINE PHASE) so that the leading edge of sync signal is one horizontal period (1H) from zero-cross point of power line waveform. (Fig. 5-9)

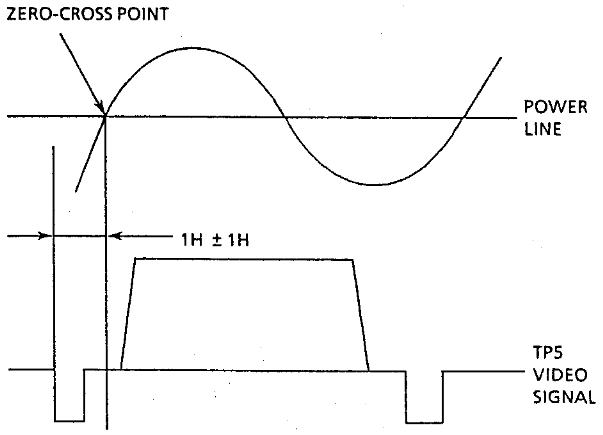
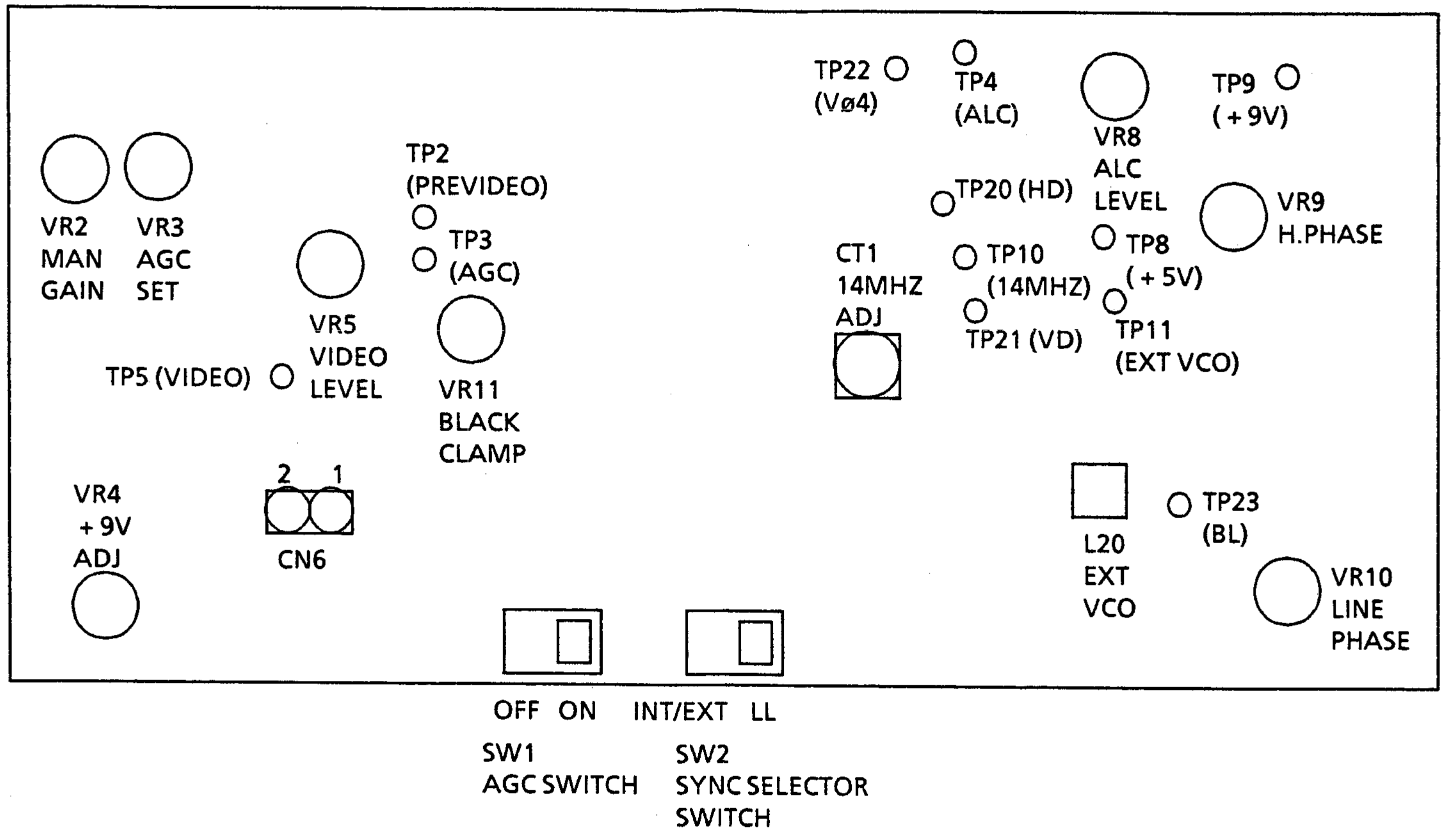

ZERO-CROSS POINT
POWER LINE
1H ± 1H
TP5 VIDEO SIGNAL

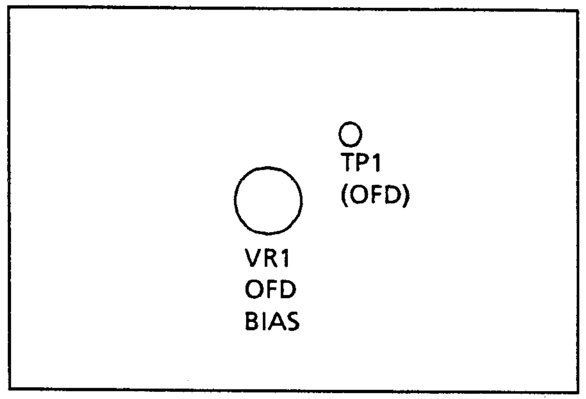
Fig. 5-9

LOCATION OF TEST POINTS AND ADJUSTMENT CONTROLS

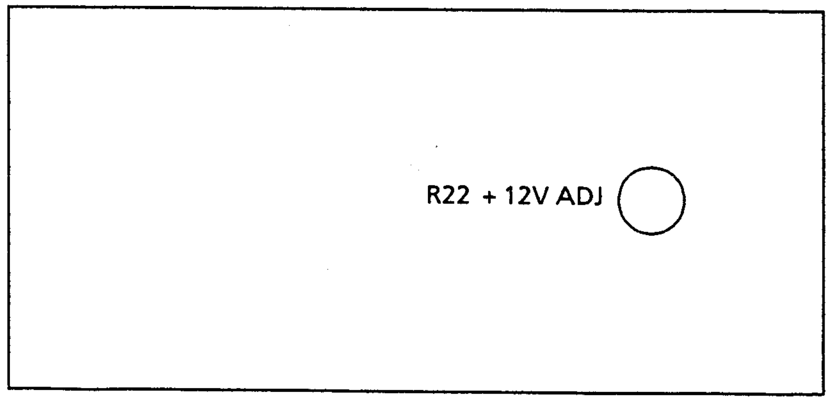
MAIN BOARD


VR2 MAN GAIN
VR3 AGC SET
VR4 +9V ADJ
TP5 (VIDEO)
VR5 VIDEO LEVEL
2 1
CN6
TP2 (PREVIDEO)
TP3 (AGC)
VR11 BLACK CLAMP
CT1 14MHZ ADJ
TP22 (Vø4)
TP4 (ALC)
TP20 (HD)
TP10 (14MHZ)
TP21 (VD)
VR8 ALC LEVEL
TP8 (+5V)
TP11 (EXT VCO)
TP9 (+9V)
VR9 H.PHASE
L20 EXT VCO
TP23 (BL)
VR10 LINE PHASE
OFF ON
INT/EXT LL
SW1 AGC SWITCH
SW2 SYNC SELECTOR SWITCH

CCD BOARD


TP1 (OFD)
VR1 OFD BIAS

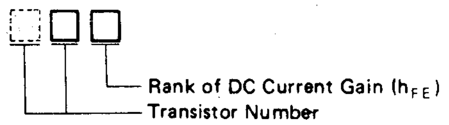
POWER BOARD



CHIP COMPONENTS

1. Chip Transistor

The transistor number is indicated on the top surface of the chip transistor using two alphabet letters or one numerical and two alphabet letters.


Rank of DC Current Gain (h_{FE})
Transistor Number

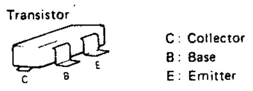
Transistor Number

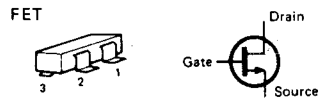
Letter	Transistor No.	Letter	Transistor No.
A	2SB709	X	2SD602A
B	2SB709A	Y	2SD601
C	2SB710	Z	2SD601A
D	2SB710A	1Z	2SD1030
E	2SA1022	1N	2SK199
F	2SA1034	1O	2SK198
H	2SA1035	1A	2SB799
I	2SB792	1B	2SB814
K	2SC2778	1C	2SB902
P	2SD814	1F	2SK321
Q	2SD813	1L	2SK247
R	2SC2480	1K	2SK316
S	2SC2405	1M	2SJ84
T	2SC2406	1T	2SC3077
U	2SC2404	1X	2SC2845
V	2SC2295	2B	2SK374
W	2SD602	2C	2SK116

Example

WQ ⟶ 2SD602 – Q
YQ ⟶ 2SD601 – Q
1BS ⟶ 2SB814 – S

Appearance and Symbols

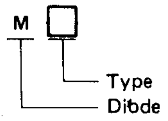

Transistor
C
B
E
C: Collector
B: Base
E: Emitter


FET
3
2
1
Drain
Gate
Source

	1	2	3
Except 2SK199	Drain	Source	Gate
2SK199	Gate	Drain	Source

2. Chip Diode

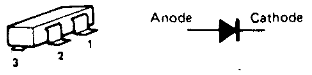
The diode number is indicated on the tcp surface of the chip diode using Two alphabet letters.


M
Type
Diode

Diode Number

Letter	Diode No.	Letter	Diode No.
MA	MA151A	MI	MA152K
MB	MA152A	MK	MA28W-B
MC	MA153	ML	MA28T-A
MD	MA28-A	MN	MA151WA
ME	MA28-B	MO	MA152WA
MF	MA28W-A	MT	MA151WK
MH	MA151K	MU	MA152WK

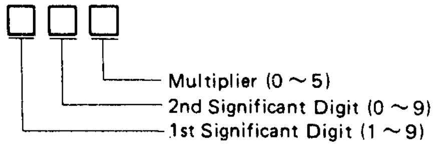
Appearance and Symbols


3
2
1
Anode
Cathode

	1	2	3
MA28/28W/28T	–	Anode	Cathode
MA151K/152K	–	Anode	Cathode
MA151A/152A	–	Cathode	Anode
MA151WK/MA152WK	Anode	Anode	Cathode
MA151WA/MA152WA	Cathode	Cathode	Anode
MA153	Cathode	Anode	Common

3. Chip Resistor

The resistor value is indicated on the bottom surface of the chip resistor using three digit numbers.


Multiplier (0 ~ 5)
2nd Significant Digit (0 ~ 9)
1st Significant Digit (1 ~ 9)

EXAMPLE:

330 ⟶ 33 x 10^0 = 33 ohms
561 ⟶ 56 x 10^1 = 560 ohms
123 ⟶ 12 x 10^3 = 12 kohms

Note: Zero ohm resistor (jumper chip) is colored red or green.

4. Chip Capacitor

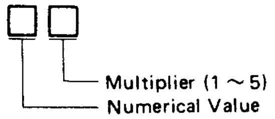
The capacitive value of replacement chip capacitors is indicated on the bottom surface. Original parts do not have value indication.

If the capacitive value is less than 100 pF, the value will be indicated by one or two digit number expressing the capacity directly in pF.

EXAMPLE:

0.5 ⟶	0.5 pF	2.5 ⟶	2.5 pF
75 ⟶	0.75 pF	33 ⟶	33 pF
1 ⟶	1 pF	82 ⟶	82 pF

If the capacitive value is 100 pF or greater, the value will be indicated by an alpha-numeric code. The letter precedes the number and expresses a numerical value to be multiplied by the number which follows.


Multiplier (1 ~ 5)
Numerical Value

Numerical Value

Letter	Value	Letter	Value
A	10	N	33
B	11	P	36
C	12	Q	39
D	13	R	43
E	15	S	47
F	16	T	51
G	18	U	56
H	20	V	62
J	22	W	68
K	24	X	75
L	27	Y	82
M	30	Z	91

* Letters I and O are not used

EXAMPLE:

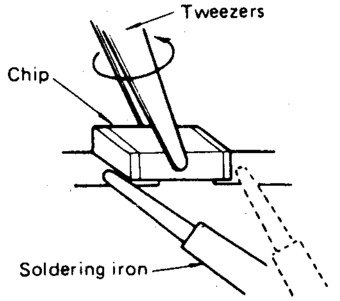
A1 ⟶ 10 x 10^1 = 100 pF
N2 ⟶ 33 x 10^2 = 3300 pF
S3 ⟶ 47 x 10^3 = 47000 pF

5. Precautions in replacing the chip component

1. Make sure that the unit is turned OFF when replacing the chip.
2. Use tweezers to prevent any damage to the chip surface.
3. Do not re-use the chips after removal.
4. Do not rub the electrode of chips.
5. Do not subject the chips to excessive stress.
6. It is recommended that a pencil-type soldering iron to be used.
7. The solder whose diameter is less than 0.5 mm is recommended.
8. Do not heat the chip beyond 3 seconds.
9. Maintain temperature control under 260°C (500°F) when soldering.

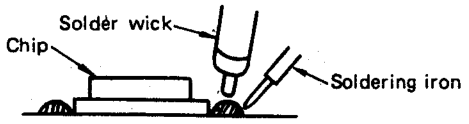
5-1 Removal (Transistor, Diode, Resistor and Capacitor)

1. Add the solder to both ends of the chip (three leads for chip transistor).
2. While attaching the soldering iron to both ends of the chip (three leads for chip transistor) as shown below, remove the chip by turning it with tweezers.
   Note Be careful not to damage other chips.

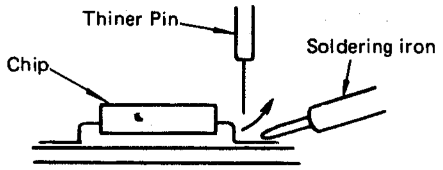

Tweezers
Chip
Soldering iron

5-2 Removal (IC)

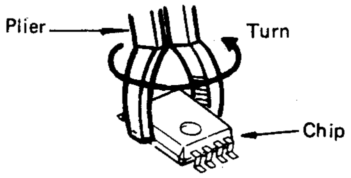
1. Add the solder wick and solder iron to each lead of the IC and remove solder.


Solder wick
Chip
Soldering iron

2. Add the solder iron to each lead of the IC and left each lead of the IC using thiner pin.

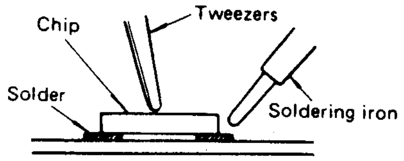

Thiner Pin
Chip
Soldering iron

3. Remove IC turning it with plier.

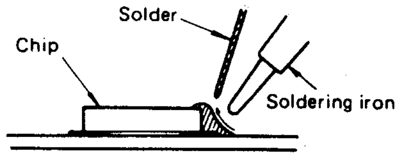

Plier
Turn
Chip

5-3 Mounting

1. Place the solder thinly on the chip mounting foil.
2. Solder the chip temporarily while holding the chip with the tweezers.

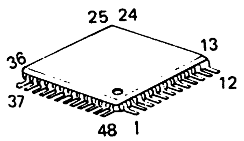

Chip
Tweezers
Solder
Soldering iron

3. Solder both ends of chip (three leads for chip transistor)


Solder
Chip
Soldering iron

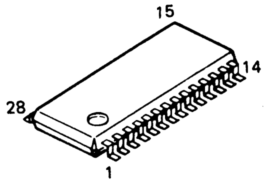
APPEARANCE OF IC TRANSISTOR AND DIODE

YWCXD1126Q

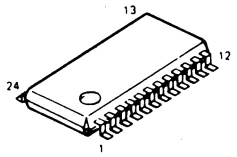


25 24
13
36
12
37
48 1

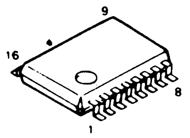
YWCXD1030M



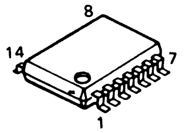
AN2210SA
AN2110S
M51266FP
YWCX20180



NJU4053BM
MN4049BS

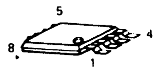


MN74HC00S

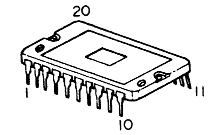


MMH0026M
MN6287S
NJM4556M
BF225AF
BF226AF

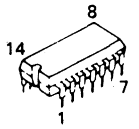
NJM3414M
NJM2904M
NJM2903M
MN8029L
NJM592M8



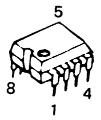
YWICX031AL



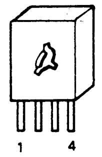
YWMC4044P



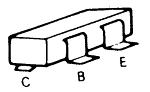
TL431CP



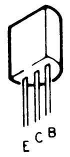
AN6531



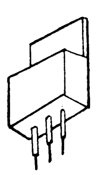
2SB814-QRS
2SC2412K7QRS
2SA1022-CD
2SC2404-CDTW
2SC601-QR
2SB709-Q
2SB710-Q



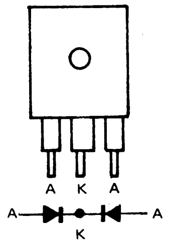
2SA684-Q
2SC1384-Q
FMW-1-T98
2SC2001-K
2SC828A-ST



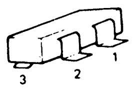
2SC1083



YWD4SC6M

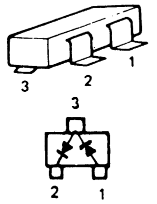


MA151K

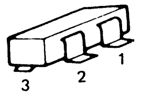


1: NC
2: Anode
3: Cathode

MA157TW

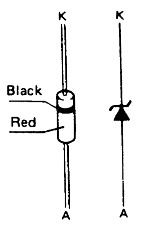


DAP202KT7



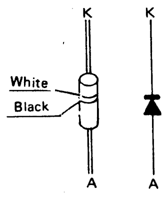
1: Anode
2: Anode
3: Cathode

YWRD15EB3
YWR5.6EB1
RD6.2EB1



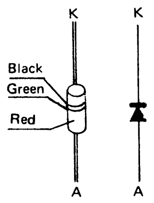
K
K
Black
Red
A
A

1SS108



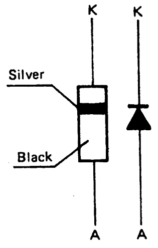
K
K
White
Black
A
A

MA171



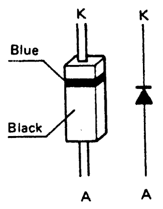
K
K
Black
Green
Red
A
A

YWERA81-004
YW10E1N
YWSV03YS
ES01F
RU1P
YW10E-6



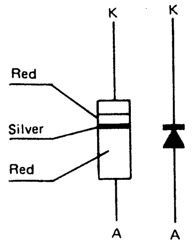
K
K
Silver
Black
A
A

MA328



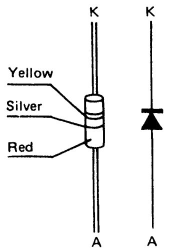
K
K
Blue
Black
A
A

1SS55



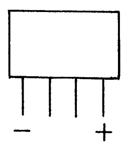
K
K
Red
Silver
Red
A
A

1SS133

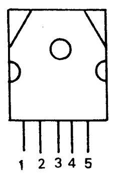


K
K
Yellow
Silver
Red
A
A

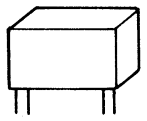
YWD2SB60



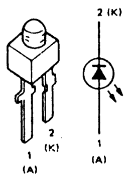
YWSTR11006-S



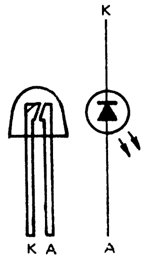
0N3105

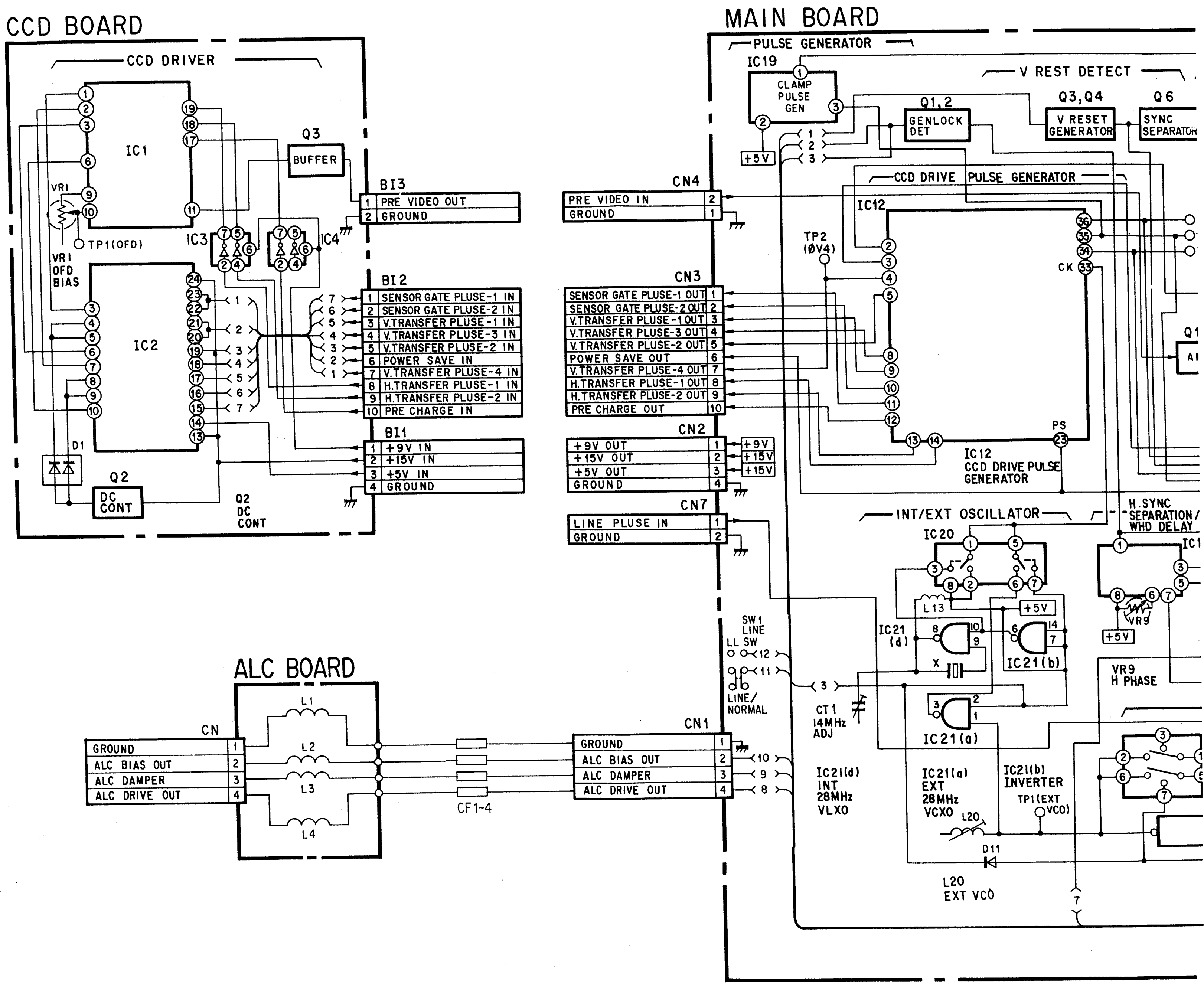


LN238RPH



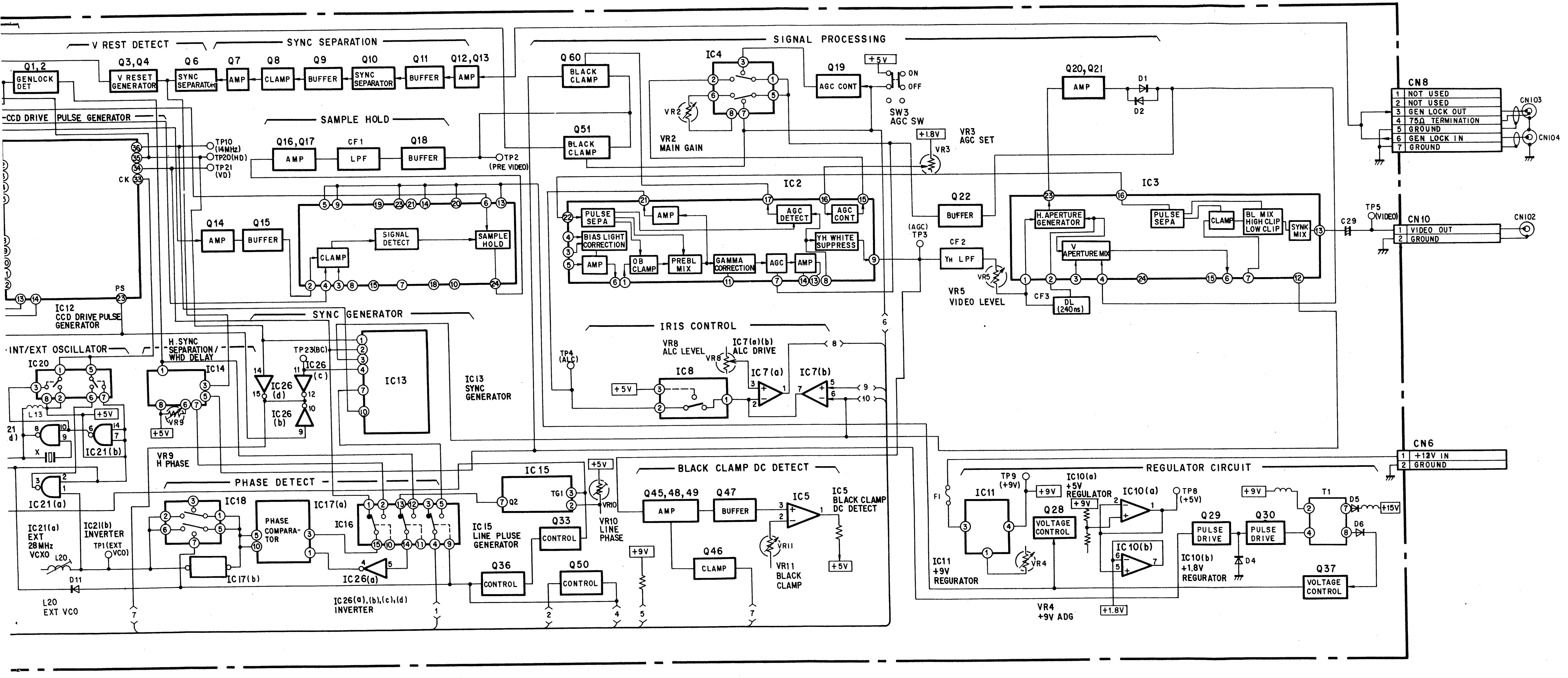
YWSE1003ZT



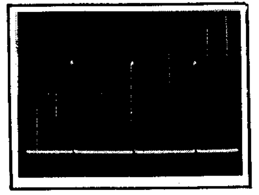


CCD BOARD
CCD DRIVER
IC1
IC2
Q3
BUFFER
VR1
TP1(OFD)
VR1 OFD BIAS
IC3
IC4
D1
Q2
DC CONT
Q2 DC CONT
BI3
1 PRE VIDEO OUT
2 GROUND
BI2
1 SENSOR GATE PLUSE-1 IN
2 SENSOR GATE PLUSE-2 IN
3 V.TRANSFER PLUSE-1 IN
4 V.TRANSFER PLUSE-3 IN
5 V.TRANSFER PLUSE-2 IN
6 POWER SAVE IN
7 V.TRANSFER PLUSE-4 IN
8 H.TRANSFER PLUSE-1 IN
9 H.TRANSFER PLUSE-2 IN
10 PRE CHARGE IN
BI1
1 +9V IN
2 +15V IN
3 +5V IN
4 GROUND
ALC BOARD
CN
GROUND 1
ALC BIAS OUT 2
ALC DAMPER 3
ALC DRIVE OUT 4
L1
L2
L3
L4
CF1~4
MAIN BOARD
PULSE GENERATOR
IC19
CLAMP PULSE GEN
+5V
V REST DETECT
Q1,2
GENLOCK DET
Q3,Q4
V RESET GENERATOR
Q6
SYNC SEPARATOR
CN4
PRE VIDEO IN 2
GROUND 1
CCD DRIVE PULSE GENERATOR
IC12
TP2 (0V4)
CK
PS
CN3
SENSOR GATE PLUSE-1 OUT 1
SENSOR GATE PLUSE-2 OUT 2
V.TRANSFER PLUSE-1 OUT 3
V.TRANSFER PLUSE-3 OUT 4
V.TRANSFER PLUSE-2 OUT 5
POWER SAVE OUT 6
V.TRANSFER PLUSE-4 OUT 7
H.TRANSFER PLUSE-1 OUT 8
H.TRANSFER PLUSE-2 OUT 9
PRE CHARGE OUT 10
CN2
+9V OUT 1
+15V OUT 2
+5V OUT 3
GROUND 4
+9V
+15V
+15V
IC12 CCD DRIVE PULSE GENERATOR
CN7
LINE PLUSE IN 1
GROUND 2
INT/EXT OSCILLATOR
H.SYNC SEPARATION/ WHD DELAY
IC20
IC21 (d)
L13
X
+5V
IC21(b)
VR9
+5V
VR9 H PHASE
SW1 LINE LL SW
LINE/ NORMAL
CT1 14MHz ADJ
IC21(a)
CN1
GROUND 1
ALC BIAS OUT 2
ALC DAMPER 3
ALC DRIVE OUT 4
IC21(d) INT 28MHz VLXO
IC21(a) EXT 28MHz VCXO
IC21(b) INVERTER
TP1(EXT VCO)
L20
D11
L20 EXT VCO

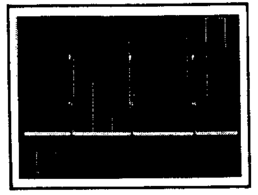
BLOCK DIAGRAM OF MAIN BOARD


V REST DETECT
SYNC SEPARATION
Q1,2
GENLOCK DET
Q3,Q4
V RESET GENERATOR
Q6
SYNC SEPARATOR
Q7
AMP
Q8
CLAMP
Q9
BUFFER
Q10
SYNC SEPARATOR
Q11
BUFFER
Q12,Q13
AMP
CCD DRIVE PULSE GENERATOR
SAMPLE HOLD
Q16,Q17
AMP
CF1
LPF
Q18
BUFFER
TP2 (PRE VIDEO)
TP10 (14MHz)
TP20(HD)
TP21 (VD)
CK
Q14
AMP
Q15
BUFFER
SIGNAL DETECT
SAMPLE HOLD
CLAMP
PS
IC12
CCD DRIVE PULSE GENERATOR
SYNC GENERATOR
INT/EXT OSCILLATOR
H.SYNC SEPARATION/WHD DELAY
IC14
IC20
TP23(BC)
IC26
IC26 (d)
IC26 (c)
IC26 (b)
IC13
IC13 SYNC GENERATOR
L13
+5V
VR9
IC21(b)
IC21(a)
VR9 H PHASE
PHASE DETECT
IC18
PHASE COMPARATOR
IC17(a)
IC16
IC17(b)
IC26(a)
IC21(a) EXT 28MHz VCXO
IC21(b) INVERTER
TP1(EXT VCO)
L20
D11
L20 EXT VCO
IC26(a),(b),(c),(d) INVERTER
IC15
TG1
Q2
IC15 LINE PLUSE GENERATOR
Q33
CONTROL
Q36
CONTROL
Q50
CONTROL
VR10
VR10 LINE PHASE
+9V
SIGNAL PROCESSING
Q60
BLACK CLAMP
Q51
BLACK CLAMP
IC4
VR2
VR2 MAIN GAIN
Q19
AGC CONT
+5V
ON
OFF
SW3 AGC SW
+1.8V
VR3
VR3 AGC SET
IC2
PULSE SEPA
AMP
AGC DETECT
AGC CONT
BIAS LIGHT CORRECTION
YH WHITE SUPPRESS
AMP
OB CLAMP
PREBL MIX
GAMMA CORRECTION
AGC
AMP
Q22
BUFFER
(AGC) TP3
CF2
YH LPF
VR5
VR5 VIDEO LEVEL
CF3
DL (240ns)
Q20,Q21
AMP
D1
D2
IC3
H.APERTURE GENERATOR
V APERTURE MIX
PULSE SEPA
CLAMP
BL MIX HIGH CLIP LOW CLIP
SYNK MIX
C29
TP5 (VIDEO)
CN8
1 NOT USED
2 NOT USED
3 GEN LOCK OUT
4 75Ω TERMINATION
5 GROUND
6 GEN LOCK IN
7 GROUND
CN103
CN104
CN10
1 VIDEO OUT
2 GROUND
CN102
IRIS CONTROL
TP4 (ALC)
VR8 ALC LEVEL
VR8
IC7(a)(b) ALC DRIVE
IC8
IC7(a)
IC7(b)
BLACK CLAMP DC DETECT
Q45,48,49
AMP
Q47
BUFFER
IC5
IC5 BLACK CLAMP DC DETECT
Q46
CLAMP
VR11
VR11 BLACK CLAMP
CN6
1 +12V IN
2 GROUND
REGULATOR CIRCUIT
F1
TP9 (+9V)
IC11
IC10(a) +5V REGULATOR
Q28
VOLTAGE CONTROL
IC10(a)
IC10(b)
TP8 (+5V)
VR4
VR4 +9V ADG
IC11 +9V REGURATOR
IC10(b) +1.8V REGURATOR
D4
Q29
PULSE DRIVE
Q30
PULSE DRIVE
T1
D5
D6
+15V
Q37
VOLTAGE CONTROL

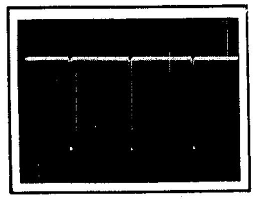
1. 2V/DIV, 20μs/DIV



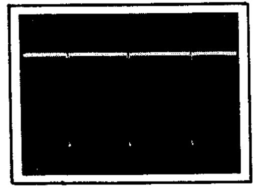
2. 2V/DIV, 20μs/DIV



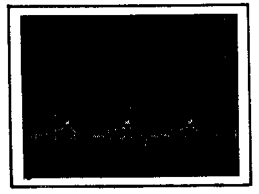
3. 2V/DIV, 20μs/DIV



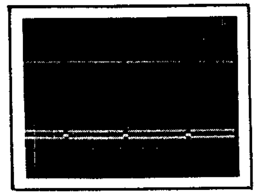
4 2V/DIV, 20μs/DIV



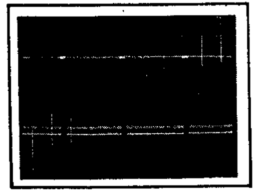
5. 0.1V/DIV, 20μs/DIV



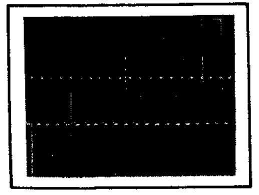
6. 2V/DIV, 20μs/DIV



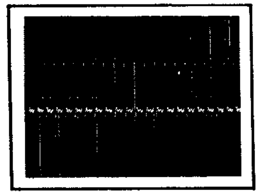
7. 2V/DIV, 20μs/DIV



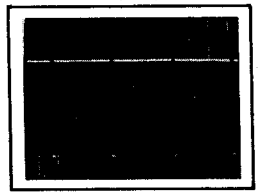
8. 2V/DIV, 0.2μs/DIV



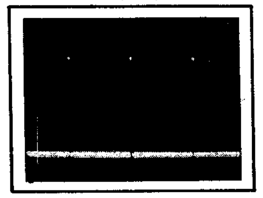
9. 2V/DIV, 0.2μs/DIV



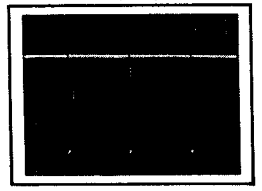
10. 1V/DIV, 20μs/DIV



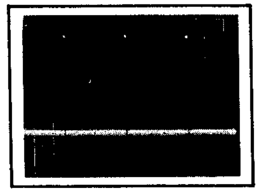
11. 1V/DIV, 20μs/DIV



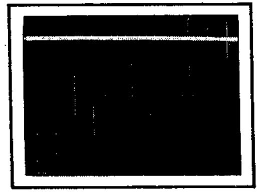
12. 1V/DIV, 20μs/DIV



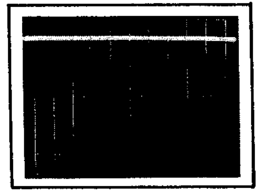
13. 1V/DIV, 20μs/DIV



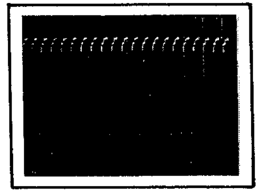
14. 1V/DIV, 5ms/DIV



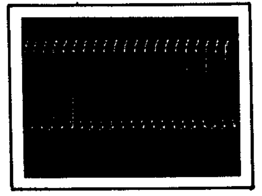
15. 1V/DIV, 5ms/DIV



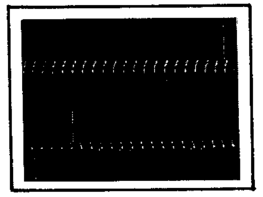
16. 1V/DIV, 0.2μs/DIV



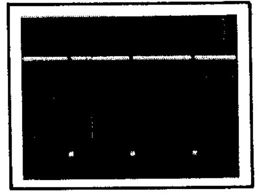
17. 1V/DIV. 0.2μs/DIV



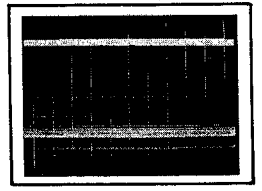
18. 1V/DIV, 0.2μs/DIV



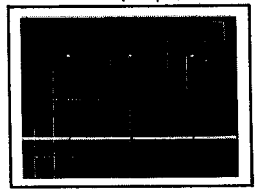
19. 1V/DIV, 20μs/DIV



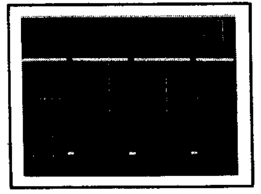
20. 1V/DIV, 20μs/DIV



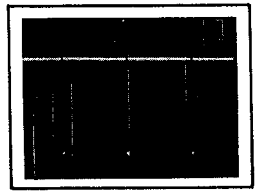
21. 1V/DIV, 20μs/DIV



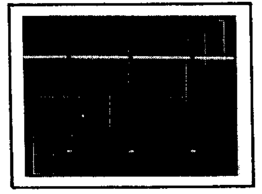
22. 1V/DIV, 20μs/DIV



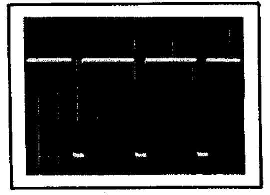
23. 1V/DIV, 5ms/DIV



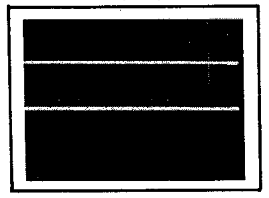
24. 1V/DIV, 20μs/DIV



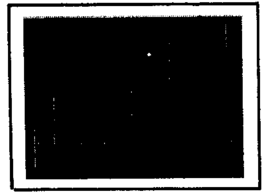
25. 1V/DIV, 20μs/DIV



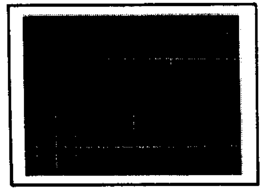
26. 2V/DIV, 50μs/DIV



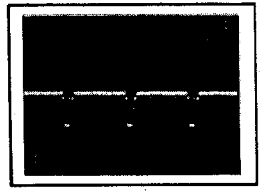
27. 1V/DIV, 20μs/DIV



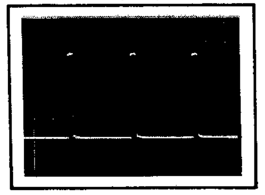
28. 1V/DIV, 20μs/DIV



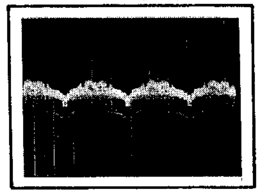
29. 0.2V/DIV, 20μs/DIV



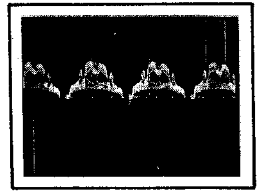
30. 2V/DIV, 20μs/DIV



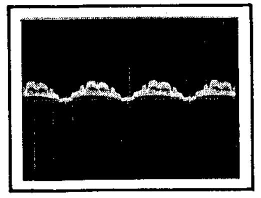
31. 0.1V/DIV, 20μs/DIV



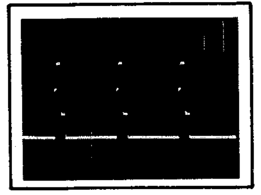
32. 0.1V/DIV, 20μs/DIV



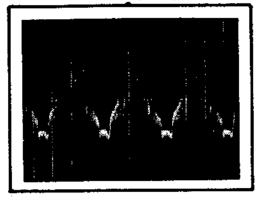
33. 0.2V/DIV, 20μs/DIV



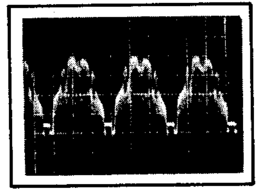
34. 1V/DIV, 20μs/DIV



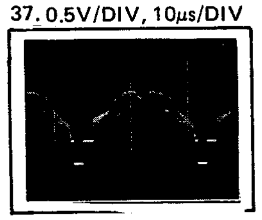
35. 0.1V/DIV, 20μs/DIV



36. 01V/DIV, 20μs/DIV



37. 0.5V/DIV, 10μs/DIV



CONDUCTOR VIEW

CCD BOARD

IC1	YW1CX030AL		C1
IC2	YWCX20180		B1
IC3	MMH0026M		C2
IC4	MMH0026M		C2
Q2	2SC2412K7QRS		B1
Q3	2SD601-QR	[Y]	C2
D1	DAP202KT7		B1
D2	DAP202KT7		C1
D3	DAP202KT7		C1
D4	MA157TW		B1
D5	DAN202KT7		C1
D6	MA151K	[MH]	C2

MAIN BOARD

IC1	M51266FP		C6
IC2	AN2110S		C7
IC3	AN2210SA		C9
IC4	MN6287S		C8
IC5	NJM2904M		A8
IC7	NJM3414M		B8
IC8	MN6287S		B7
IC10	NJM4556M		A9
IC11	AN6531		A8
IC12	YWCXD1126Q		C4
IC13	YWCXD1030M		B5
IC14	BA225AF		B5
IC15	BA226AF		B6
IC16	NJU4053BM		A6
IC17	YWMC4044P		A4, A5
IC18	MN6287S		A4
IC19	BA226AF		D3
IC20	MN6287S		B4
IC21	MN74HC00S		A4
IC26	MN4049BS		A5, B5
Q1	2SD601-QR	[Y]	C4
Q2	2SD601-QR	[Y]	D4
Q3	2SB709-Q	[A]	D4
Q4	FMW-1-T98		C4
Q6	2SA1022-C	[E]	D5
Q7	FMW-1-T98		D5
Q8	2SD601-QR	[Y]	C5
Q9	2SD601-QR	[Y]	C6
Q10	2SB814-QRS	[1B]	D6
Q11	2SB709-Q	[A]	C6
Q12	2SA1022-C	[E]	D6
Q13	2SC2404-CDTW	[V]	D6
Q14	2SC2404-CDTW	[U]	C5
Q15	2SC2404-CDTW	[U]	C5
Q16	2SC2404-CDTW	[U]	C5
Q17	2SC2404-CDTW	[U]	C6
Q18	2SC2404-CDTW	[U]	C6
Q19	2SD601-QR	[Y]	C8
Q20	2SD601-QR	[Y]	C9
Q21	2SD601-QR	[Y]	D9
Q22	2SD601-QR	[Y]	C8
Q28	2SB710-Q	[C]	A8
Q29	2SD601-QR	[Y]	A9
Q30	2SD1083		A9
Q33	2SC2404-CDTW	[V]	A6
Q36	2SC2404-CDTW	[U]	A6
Q37	2SD601-QR	[Y]	A10
Q45	2SB709-Q	[A]	A7
Q46	2SC2404-CDTW	[U]	A7
Q47	2SC2404-CDTW	[U]	A7
Q48	2SC2404-CDTW	[U]	A7
Q49	2SB709-Q	[A]	A7
Q50	2SC2404-CDTW	[U]	A6
Q51	2SC2404-CDTW	[U]	C7
Q60	FMW-1-T98		D7
D1	1SS108		C9
D2	1SS108		C9
D4	MA151K	[MH]	A9
D5	ES01F		A10
D11	MA151K	[MH]	A3
D12	MA328		A4
D13	MA151K	[MH]	C6
D14	MA151K	[MH]	C5
D15	DAP202KT7		C7

SCHEMATIC DIAGRAM

CCD BOARD

IC1	YWICX030AL		C2
IC2	YWCX20180		D3
IC3	MMH0026M		D1
IC4	MMH0026M		C1
Q2	2SC2412K7QRS		C3
Q3	2SD601-QR	[Y]	C2
D1	DAP202KT7		C3
D2	DAP202KT7		D2
D3	DAP202KT7		D2
D4	MA157TW		D2
D5	DAN202KT7		C1
D6	MA151K	[MH]	C1

MAIN BOARD

IC1	M51266FP		C8
IC2	AN2110S		C10
IC3	AN2210SA		C9
IC4	MN6287S		C10
IC5	NJM2904M		B8
IC7	NJM3414M		C5
IC8	MN6287S		C5
IC10	NJM4556M		B9
IC11	AN6531		A10
IC12	YWCXD1126Q		C7
IC13	YWCXD1030M		C7
IC14	BA225AF		C5
IC15	BA226AF		B5
IC16	NJU4053BM		B6
IC17	YWMC4044P		C6
IC18	MN6287S		C5
IC19	BA226AF		C7
IC20	MN6287S		C7
IC21	MN74HC00S		B7
IC26	MN4049BS		B6
Q1	2SD601-QR	[Y]	C5
Q2	2SD601-QR	[Y]	C5
Q3	2SB709-Q	[A]	B5
Q4	FMW-1-T98		B5
Q6	2SA1022-C	[E]	C5
Q7	FMW-1-T98		B5
Q8	2SD601-QR	[Y]	B5
Q9	2SD601-QR	[Y]	B5
Q10	2SB814-QRS	[1B]	B5
Q11	2SB709-Q	[A]	B5
Q12	2SA1022-C	[E]	B5
Q13	2SC2404-CDTW	[V]	B5
Q14	2SC2404-CDTW	[V]	C8
Q15	2SC2404-CDTW	[V]	C8
Q16	2SC2404-CDTW	[V]	C8
Q17	2SC2404-CDTW	[V]	C8
Q18	2SC2404-CDTW	[V]	C8
Q19	2SD601-QR	[Y]	A8
Q20	2SD601-QR	[Y]	B9
Q21	2SD601-QR	[Y]	B9
Q22	2SD601-QR	[Y]	C9
Q28	2SB710-Q	[C]	B10
Q29	2SD601-QR	[Y]	B10
Q30	2SD1083		B10
Q33	2SC2404-CDTW	[U]	A7
Q36	2SC2404-CDTW	[U]	A7
Q37	2SD601-QR	[Y]	C10
Q45	2SB709-Q	[A]	B8
Q46	2SC2404-CDTW	[U]	B8
Q47	2SC2404-CDTW	[U]	B8
Q48	2SC2404-CDTW	[U]	B8
Q49	2SB709-Q	[A]	B8
Q50	2SC2404-CDTW	[U]	B7
Q51	2SC2404-CDTW	[U]	C9
Q60	FMW-1-T98		B9
D1	1SS108		B9
D2	1SS108		B10
D4	MA151K	[MH]	B10
D5	ES01F		C10
D6	MA171		C10
D11	MA151K	[MH]	B7
D12	MA328		B7
D13	MA151K		B5
D14	MA151K	[MH]	D7
D15	DAP202KT7	[MH]	B9

CCD BOARD

	IC1	IC2	IC3	IC4
Pin 1	12.1	0	0	0
2	15.3	1.5	0.7	1.2
3	0	0.4	0	0
4	0	9.4	0.8	0
5	-0.4	9.4	—	8.4
6	0	9.2	8.8	8.4
7	0	0.4	—	—
8	-0.4	9.4	0	0
9	-8.7	9.4		
10	-8.7	9.2		
11	-11.2	0		
12	6.8	0		
13	5.8	15.1		
14	-166	5.0		
15	0	4.9		
16	14.2	4.9		
17	0	0.1		
18	1.7	4.7		
19	0	0.1		
20	10.2	4.5		
21		4.5		
22		4,.7		
23		4.7		
24		15.1		

	B	C	E
Q2	10.2	14.9	9.5
Q3	10.7	215.1	10.0

CCD BOARD

	IC1	IC2	IC3	IC4
Pin 1	12.1	0	0	0
2	15.3	1.5	0.7	1.2
3	0	0.4	0	0
4	0	9.4	0.8	0
5	-0.4	9.4	—	8.4
6	0	9.2	8.8	8.4
7	0	0.4	—	—
8	-0.4	9.4	0	0
9	-8.7	9.4		
10	-8.7	9.2		
11	-11.2	0		
12	6.8	0		
13	5.8	15.1		
14	-166	5.0		
15	0	4.9		
16	14.2	4.9		
17	0	0.1		
18	1.7	4.7		
19	0	0.1		
20	10.2	4.5		
21		4.5		
22		4,.7		
23		4.7		
24		15.1		

	B	C	E
Q2	10.2	14.9	9.5
Q3	10.7	215.1	10.0

MAIN BOARD

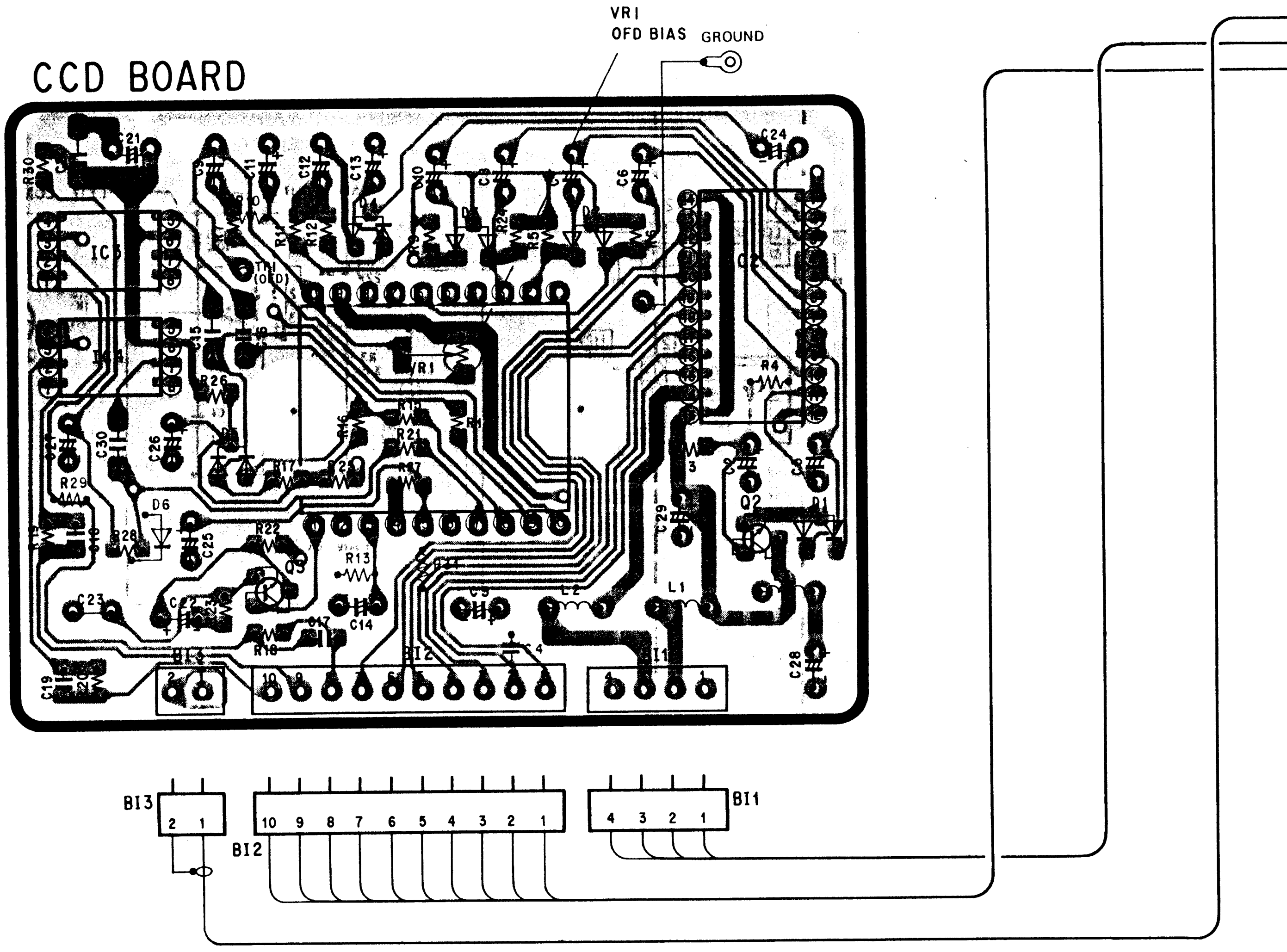
	B	C	E
Q1	0	5.0	0
Q2	0	5,0	0
Q3	5.0	0	5.0
Q6	8.2	9.0	9.0
Q8	0.7	0.4	4.4
Q9	1.3	9.0	0.7
Q10	8.3	8.2	9.0
Q11	3.6	0	4.3
Q12	6.8	3.6	7.5
Q13	2.3	6.8	1.5
Q14	1.6	7.5	0.9
Q15	7.5	.9.0	6.8
Q16	1.6	9.0	1.0
Q17	1.6	4.4	0.9
Q18	4.3	9.0	3.6
Q19	0	5.0	0
Q20	3.6	6.7	3.0
Q21	6.7	9.0	6.1
Q22	1.9	1.8	1.8
Q28	5.0	5.0	5.6
Q29	1.5	6.6	5.1
Q30	5.7	8.3	5.1
Q33	0.8	0	0
Q36	0	7.5	0
Q37	5.6	6.1	4.9
Q38	5.0	0.2	5.0
Q45	3.5	0	3.8
Q46	0.2	3.1	0
Q47	3.8	9.0	3.9
Q48	2.5	3.6	1.8
Q49	1.9	0	2.5
Q50	0	0	0
Q51	0.1	2.5	1.9

	1	2	3	4	5
Q4	4.3	3.7	1.2	5.0	5.0
Q7	0.5	4.0	4.6	9.0	8.1
Q60	2.5	1.9	1.4	5.0	5.0

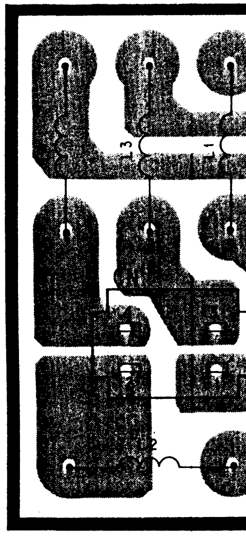
	IC12		IC12
Pin 1	—	Pin 25	4.9
2	—	26	0
3	—	27	0
4	4.8	28	5.0
5	0.1	29	5.0
6	0	30	0
7	0	31	0
8	4.8	32	102.4
9	0.1	33	2.0
10	5.0	34	4.8
11	5.0	35	4.5
12	2.7	36	-11.3
13	—	37	4.7
14	—	38	0
15	0.1	39	0
16	0.1	40	0
17	4.9	41	0.1
18	4.8	42	0.1
19	5.0	43	5.0
20	0	44	0
21	5.0	45	-4.0
22	0	46	-4.1
23	4.6	47	-5.3
24	0	48	0.5

	IC1	IC2	IC3	IC4	IC5	IC7	IC8	IC10	IC11	IC13	IC14	IC15	IC16	IC17	IC18	IC19	IC20	IC21	IC26
Pin 1	0	1.8	1.8	1.6	0	2.6	1.9	5.0	5.0	4.5	0	0	4.8	5.0	1.5	0.2	2.0	5.0	5.0
2	2.4	1.8	1.8	1.6	3.9	1.8	1.9	5.0	0	4.8	0	0	0.3	0.1	0.7	0.3	—	0	0
3	2.4	1.8	1.7	5.0	3.9	1.8	5.0	5.0	11.9	4.5	0	0	0	0.4	0	4.3	5.0	5.0	0
4	—	1.8	1.8	0	0	0	0	0	9.0	3.8	0	0	0	3.9	0	0	0	0	0
5	4.9	1.8	5.0	1.6	0.3	1.8	0	1.8		0	0.5	0	0	1.5	1.5	0	2.0	0	0
6	—	2.5	3.1	1.2	0.3	1.8	0	1.8		0	0.6	1.1	0	0	0.7	0	5.0	0	0
7	2.4	1,9	1.6	0	7.9	1.8	0	1.8		0	0.3	0	0	0	0	0	0	0	0
8	2.4	1.9	1.8	5.0	9.0	5.0	5.0	9.0		0	5.0	5.0	0	0.8	9.0	0	5.0	—	0
9	4.9	1.8	0							0			0	1.5.				0	4.6
10	2.4	1.9	0							2.4			0	2.2				5.0	0
11	0	2.2	0							2.2			0	0.1				5.0	0
12	2.3	5.0	0							2.5			0	0.2				0	1.1
13	4.9	0	0							2.5			0	3.9				0	0
14	4.9	2.7	5.0							0			0	5.0				5.0	4.5
15	4.9	2.2	0							5.0			0.4						0.5
16	0	1.8	1.2							0.2			9.0						0
17	0	2.0	1.0							0									
18	1.4	2.6	0							0									
19	1.4	2.1	0							5.0									
20	1.4	1.8	3.2							5.0									
21	1.4	0	5.0							0									
22	0	1.2	1.8							5.0									
23	1.4	0	2.9							0									
24	2.5	1.8	0							2.4									
25										2.1									
26										1.2									
27										0									
28										0									

CCD BOARD


VR1
OFD BIAS
GROUND
C21
R30
IC5
C24
TP1 (OFD)
VR1
R26
R29
D6
C25
R22
Q3
R13
C23
R18
C17
C14
C19
BI3
BI2
BI1
L1
L2
Q2
D1
R4
C28
C29
C30
C26
2 1
10 9 8 7 6 5 4 3 2 1
4 3 2 1

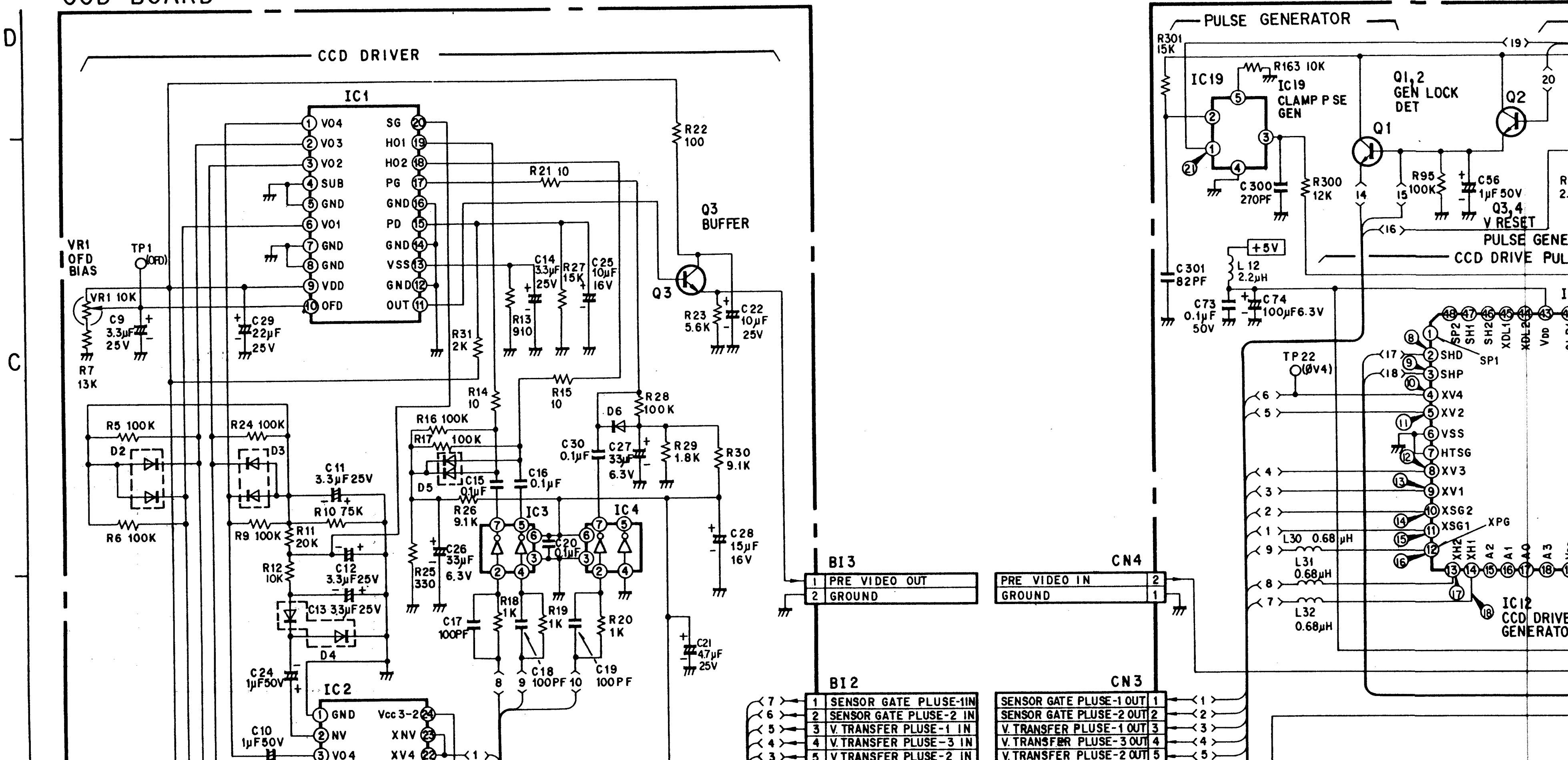
ALC BOARD

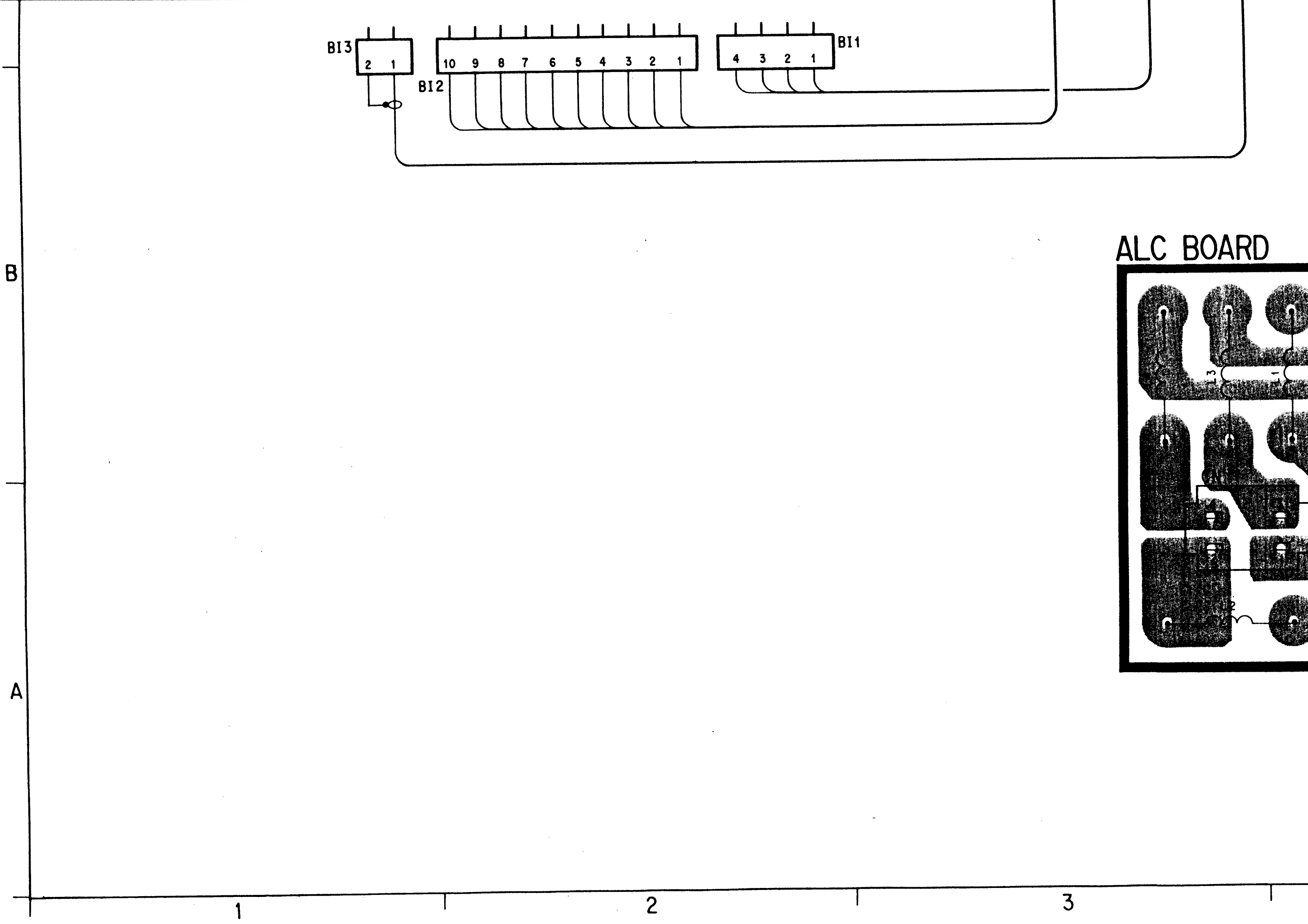


D
C
B
A
1
2
3

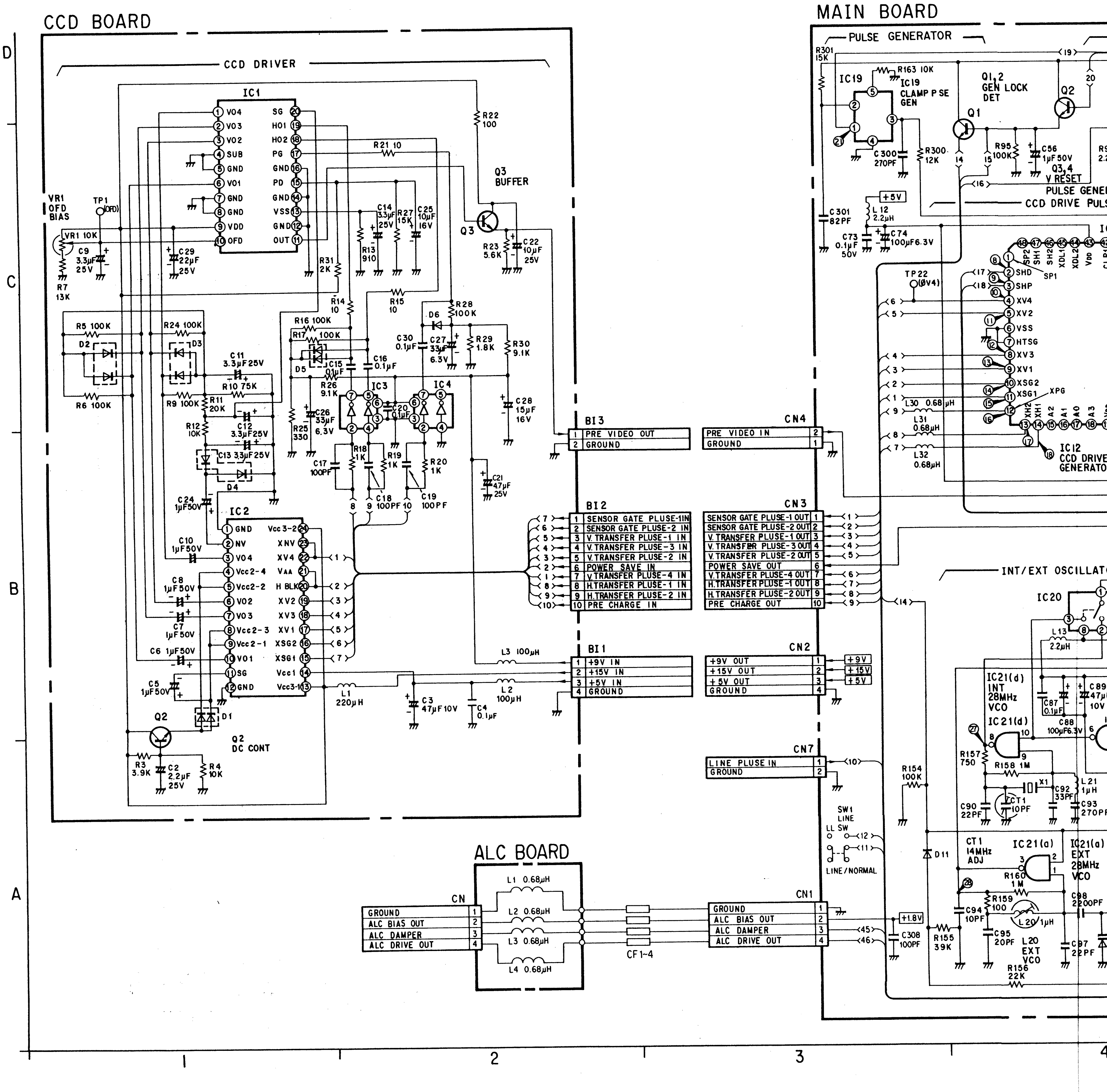
CCD BOARD

MAIN BOARD


CCD DRIVER
IC1
VO4
VO3
VO2
SUB
GND
VO1
GND
GND
VDD
OFD
SG
HO1
HO2
PG
GND
PD
GND
VSS
GND
OUT
R22 100
R21 10
Q3 BUFFER
VR1 OFD BIAS
TP1 (OFD)
VR1 10K
C9 3.3µF 25V
R7 13K
C29 22µF 25V
C14 3.3µF 25V
R27 15K
C25 10µF 16V
R13 910
R31 2K
R23 5.6K
C22 10µF 25V
R5 100K
R24 100K
D2
D3
R6 100K
R9 100K
C11 3.3µF 25V
R10 75K
R11 20K
R12 10K
C12 3.3µF 25V
C13 3.3µF 25V
D4
C24 1µF 50V
IC2
GND
NV
VO4
Vcc 3-2
XNV
XV4
C10 1µF 50V
R14 10
R15 10
R16 100K
R17 100K
D5
C15 0.1µF
C16 0.1µF
R26 9.1K
IC3
C20 0.1µF
IC4
R25 330
C26 33µF 6.3V
C17 100PF
R18 1K
R19 1K
R20 1K
C18 100PF
C19 100PF
D6
R28 100K
C30 0.1µF
C27 33µF 6.3V
R29 1.8K
R30 9.1K
C28 15µF 16V
C21 47µF 25V
BI3
1 PRE VIDEO OUT
2 GROUND
CN4
PRE VIDEO IN
GROUND
BI2
1 SENSOR GATE PLUSE-1 IN
2 SENSOR GATE PLUSE-2 IN
3 V. TRANSFER PLUSE-1 IN
4 V. TRANSFER PLUSE-3 IN
5 V. TRANSFER PLUSE-2 IN
CN3
SENSOR GATE PLUSE-1 OUT 1
SENSOR GATE PLUSE-2 OUT 2
V. TRANSFER PLUSE-1 OUT 3
V. TRANSFER PLUSE-3 OUT 4
V. TRANSFER PLUSE-2 OUT 5
PULSE GENERATOR
R301 15K
IC19
R163 10K
IC19 CLAMP P SE GEN
Q1,2 GEN LOCK DET
Q1
Q2
C300 270PF
R300 12K
R95 100K
C56 1µF 50V
Q3,4 V RESET
PULSE GENE
CCD DRIVE PUL
+5V
C301 82PF
L12 2.2µH
C73 0.1µF 50V
C74 100µF 6.3V
TP22 (0V4)
SHD
SHP
XV4
XV2
VSS
HTSG
XV3
XV1
XSG2
XSG1
XPG
L30 0.68µH
L31 0.68µH
L32 0.68µH
IC12 CCD DRIVE GENERATO

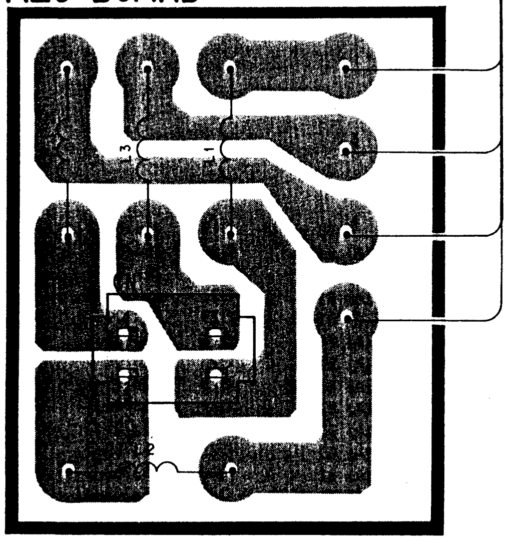


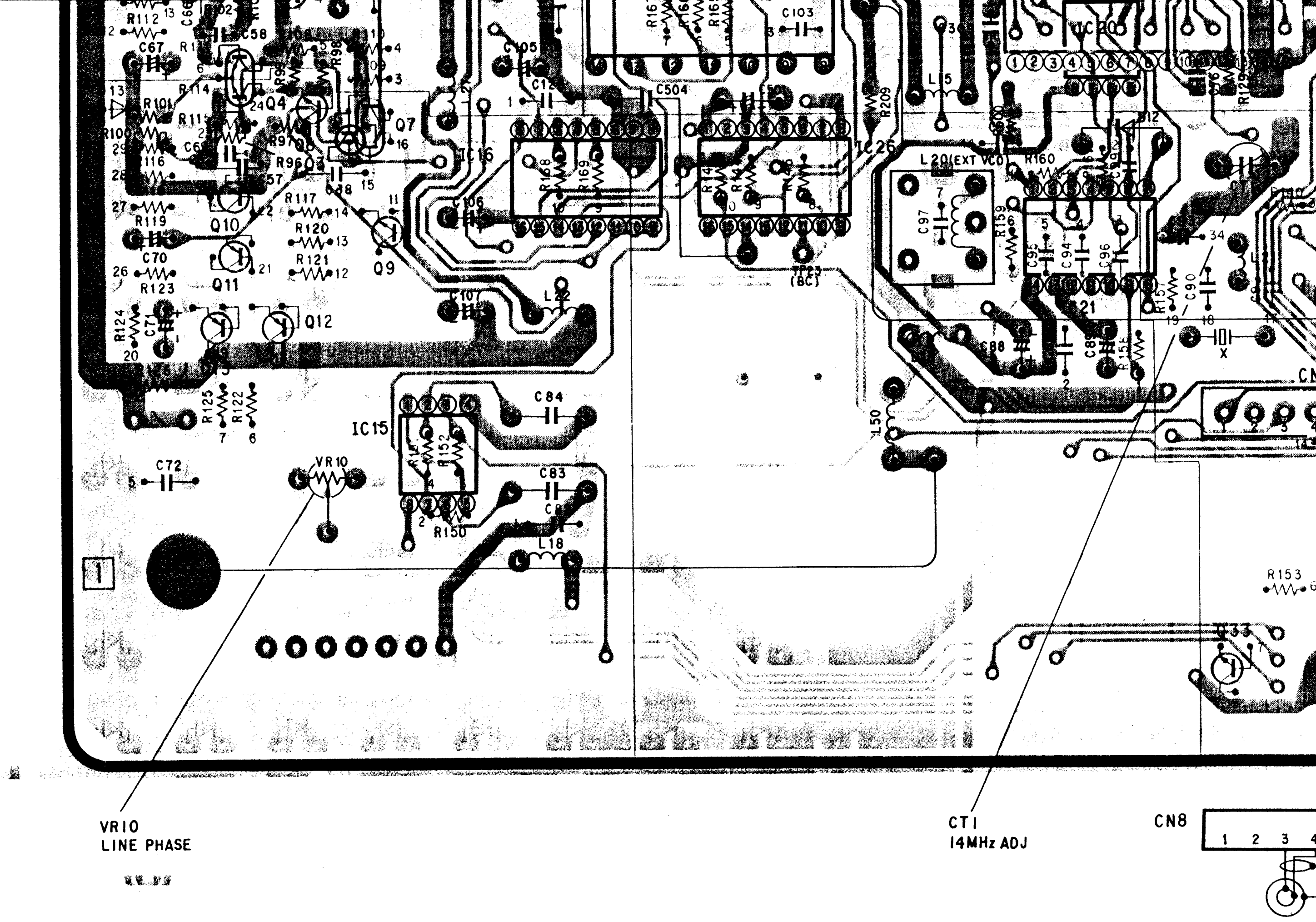
BI3
2 1
10 9 8 7 6 5 4 3 2 1
BI2
BI1
4 3 2 1
ALC BOARD
B
A
1
2
3



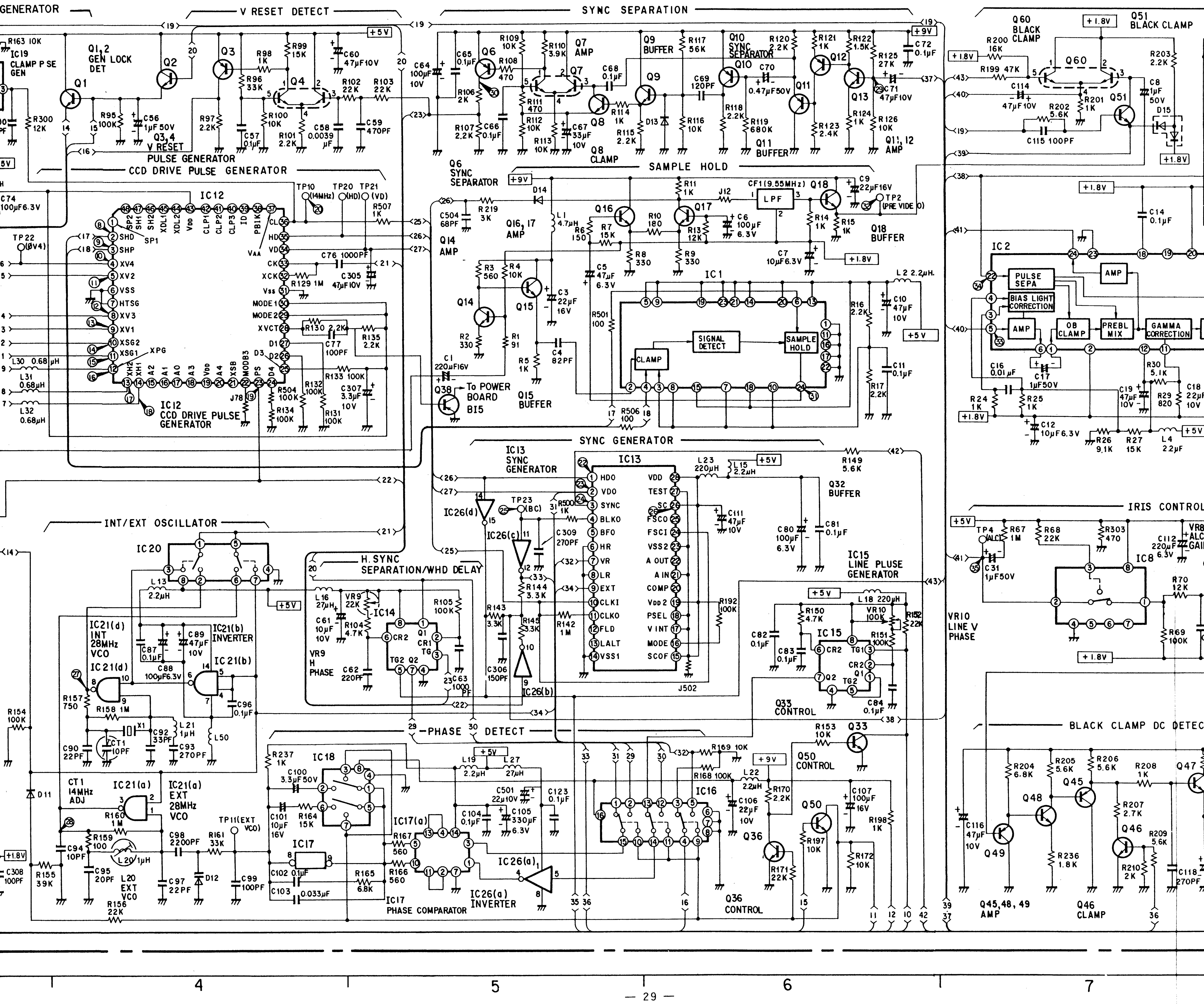
CCD BOARD
CCD DRIVER
IC1
VO4
VO3
VO2
SUB
GND
VO1
GND
GND
VDD
OFD
SG
HO1
HO2
PG
GND
PD
GND
VSS
GND
OUT
R22 100
R21 10
Q3 BUFFER
Q3
R23 5.6K
C22 10μF 25V
VR1 OFD BIAS
TP1 (OFD)
VR1 10K
C9 3.3μF 25V
C29 22μF 25V
R7 13K
C14 3.3μF 25V
R27 15K
C25 10μF 16V
R13 910
R31 2K
R14 10
R15 10
R28 100K
R5 100K
R24 100K
D2
D3
R6 100K
R9 100K
C11 3.3μF 25V
R10 75K
R11 20K
R12 10K
C12 3.3μF 25V
C13 3.3μF 25V
D4
R16 100K
R17 100K
D5
C15 0.1μF
C16 0.1μF
D6
C30 0.1μF
C27 33μF 6.3V
R29 1.8K
R30 9.1K
R26 9.1K
C26 33μF 6.3V
R25 330
IC3
IC4
C20 0.1μF
C28 15μF 16V
R18 1K
R19 1K
R20 1K
C17 100PF
C18 100PF
C19 100PF
C21 47μF 25V
C24 1μF 50V
IC2
GND
NV
VO4
Vcc2-4
Vcc2-2
VO2
VO3
Vcc2-3
Vcc2-1
VO1
SG
GND
Vcc3-2
XNV
XV4
VAA
H BLK
XV2
XV3
XV1
XSG2
XSG1
Vcc1
Vcc3-1
C10 1μF 50V
C8 1μF 50V
C7 1μF 50V
C6 1μF 50V
C5 1μF 50V
D1
Q2
Q2 DC CONT
R3 3.9K
C2 2.2μF 25V
R4 10K
L1 220μH
C3 47μF 10V
C4 0.1μF
L2 100μH
L3 100μH
BI3
1 PRE VIDEO OUT
2 GROUND
BI2
1 SENSOR GATE PLUSE-1 IN
2 SENSOR GATE PLUSE-2 IN
3 V. TRANSFER PLUSE-1 IN
4 V. TRANSFER PLUSE-3 IN
5 V. TRANSFER PLUSE-2 IN
6 POWER SAVE IN
7 V. TRANSFER PLUSE-4 IN
8 H. TRANSFER PLUSE-1 IN
9 H. TRANSFER PLUSE-2 IN
10 PRE CHARGE IN
BI1
1 +9V IN
2 +15V IN
3 +5V IN
4 GROUND
CN4
PRE VIDEO IN 2
GROUND 1
CN3
SENSOR GATE PLUSE-1 OUT 1
SENSOR GATE PLUSE-2 OUT 2
V. TRANSFER PLUSE-1 OUT 3
V. TRANSFER PLUSE-3 OUT 4
V. TRANSFER PLUSE-2 OUT 5
POWER SAVE OUT 6
V. TRANSFER PLUSE-4 OUT 7
H. TRANSFER PLUSE-1 OUT 8
H. TRANSFER PLUSE-2 OUT 9
PRE CHARGE OUT 10
CN2
+9V OUT 1
+15V OUT 2
+5V OUT 3
GROUND 4
+9V
+15V
+5V
CN7
LINE PLUSE IN 1
GROUND 2
SW1 LINE
LL SW
LINE/NORMAL
ALC BOARD
CN
GROUND 1
ALC BIAS OUT 2
ALC DAMPER 3
ALC DRIVE OUT 4
L1 0.68μH
L2 0.68μH
L3 0.68μH
L4 0.68μH
CF1-4
CN1
GROUND 1
ALC BIAS OUT 2
ALC DAMPER 3
ALC DRIVE OUT 4
MAIN BOARD
PULSE GENERATOR
R301 15K
IC19
R163 10K
IC19 CLAMP PSE GEN
Q1,2 GEN LOCK DET
Q1
Q2
C300 270PF
R300 12K
R95 100K
C56 1μF 50V
Q3,4 V RESET
PULSE GENE
CCD DRIVE PULS
+5V
L12 2.2μH
C301 82PF
C73 0.1μF 50V
C74 100μF 6.3V
TP22 (ØV4)
SHD
SHP
XV4
XV2
VSS
HTSG
XV3
XV1
XSG2
XSG1
XPG
SP1
L30 0.68μH
L31 0.68μH
L32 0.68μH
IC12 CCD DRIVE GENERATOR
INT/EXT OSCILLAT
IC20
L13 2.2μH
IC21(d) INT 28MHz VCO
IC21(d)
C87 0.1μF
C89 47μ 10V
C88 100μF 6.3V
R157 750
R158 1M
R154 100K
X1
C92 33PF
L21 1μH
C93 270PF
C90 22PF
CT1 10PF
D11
CT1 14MHz ADJ
IC21(a)
IC21(a) EXT 28MHz VCO
R160 1M
R159 100
C98 2200PF
C94 10PF
L20 1μH
+1.8V
C308 100PF
R155 39K
C95 20PF
L20 EXT VCO
C97 22PF
R156 22K
D
C
B
A
1
2
3
4

ALC BOARD

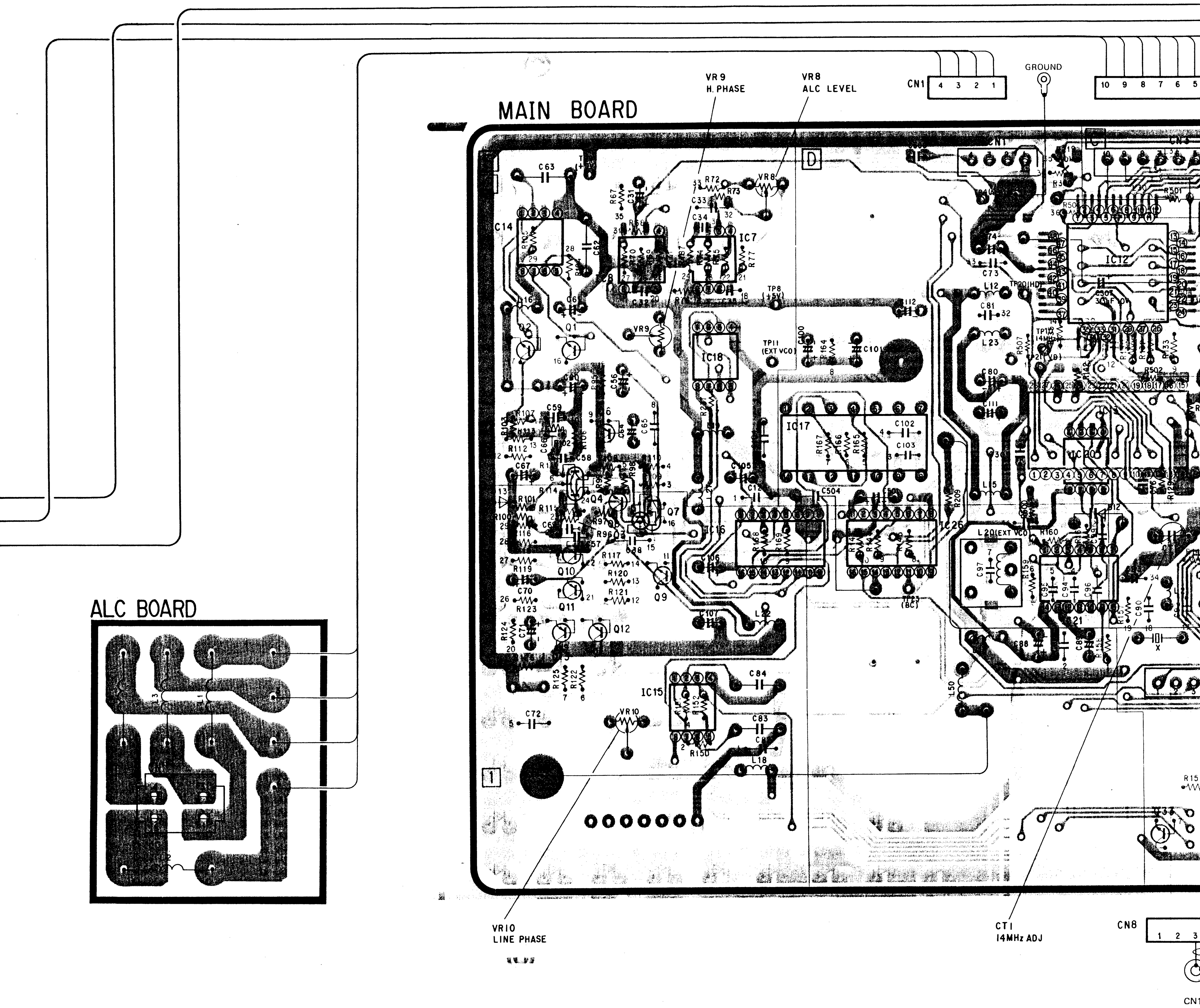



IC15
IC16
IC26
IC20
IC21
VR10
L20(EXT VCO)
L50
L18
TP23 (BC)
1
VR10
LINE PHASE
CT1
14MHz ADJ
CN8
1 2 3 4
CN103
R153

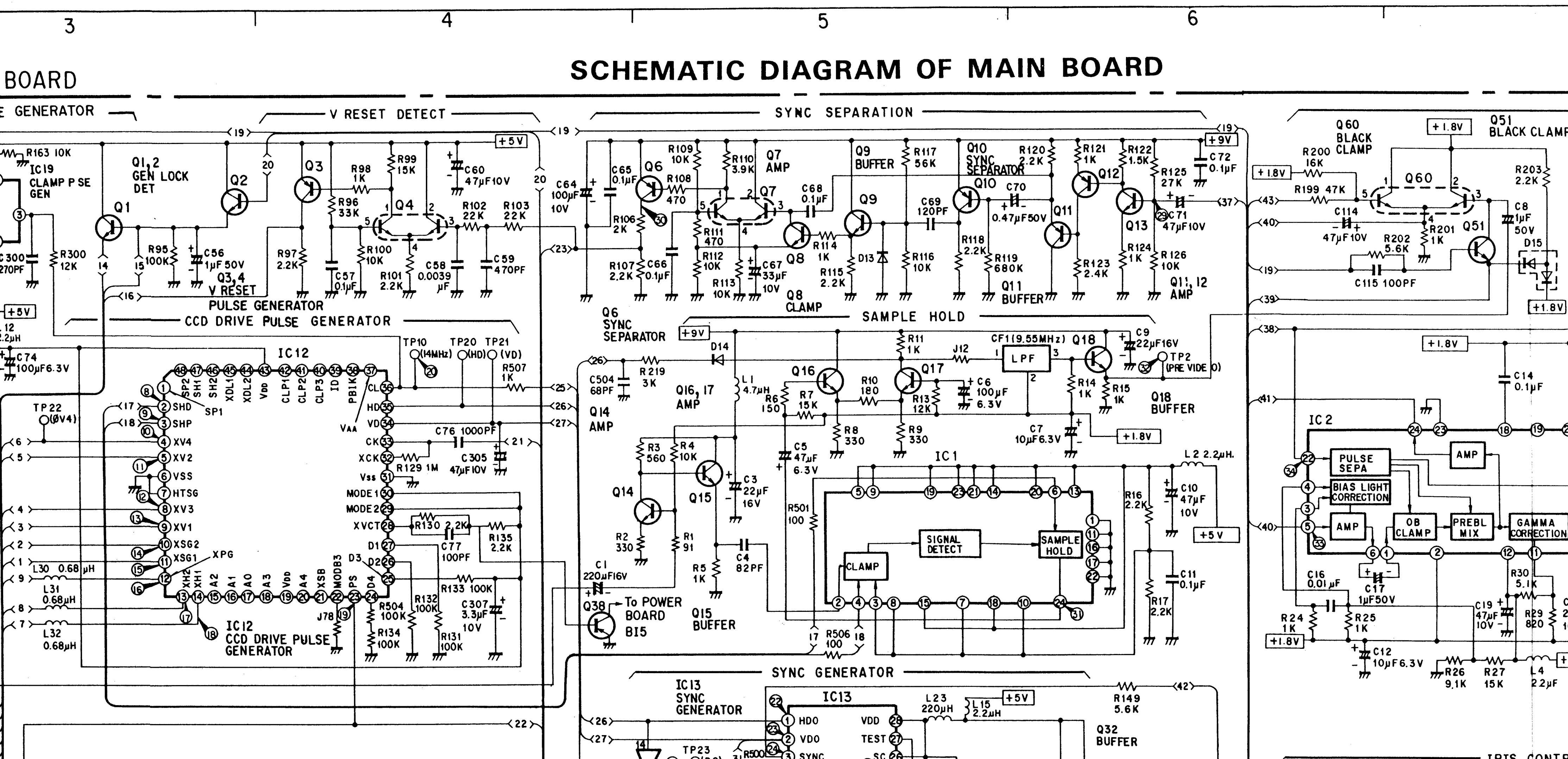
SCHEMATIC DIAGRAM OF MAIN BOARD


3
4
5
6
7
BOARD
GENERATOR
V RESET DETECT
SYNC SEPARATION
Q1,2 GEN LOCK DET
Q3,4 V RESET PULSE GENERATOR
IC19 CLAMP P SE GEN
CCD DRIVE PULSE GENERATOR
IC12
IC12 CCD DRIVE PULSE GENERATOR
Q6 SYNC SEPARATOR
Q7 AMP
Q8 CLAMP
Q9 BUFFER
Q10 SYNC SEPARATOR
Q11, 12 BUFFER
Q11, 12 AMP
Q60 BLACK CLAMP
Q51 BLACK CLAMP
SAMPLE HOLD
Q14 AMP
Q15 BUFFER
Q16, 17 AMP
Q18 BUFFER
CF1(9.55MHz)
LPF
TP2 (PRE VIDEO)
IC1
CLAMP
SIGNAL DETECT
SAMPLE HOLD
Q38 To POWER BOARD BI5
IC2
PULSE SEPA
BIAS LIGHT CORRECTION
AMP
OB CLAMP
PREBL MIX
GAMMA CORRECTION
SYNC GENERATOR
IC13 SYNC GENERATOR
IC13
HDO VDO SYNC BLKO BFO HR VR LR EXT CLKI CLKO FLD LALT VSS1
VDD TEST SC FSCO FSCI VSS2 A OUT A IN COMP VDD2 PSEL V INT MODE SCOF
Q32 BUFFER
IC15 LINE PLUSE GENERATOR
VR10 LINE V PHASE
IRIS CONTROL
IC8
INT/EXT OSCILLATOR
IC20
IC21(d) INT 28MHz VCO
IC21(b) INVERTER
H. SYNC SEPARATION/WHD DELAY
IC14
VR9 H PHASE
IC26(d)
IC26(c)
IC26(b)
IC26(a) INVERTER
PHASE DETECT
IC18
IC17
IC17(a)
IC17 PHASE COMPARATOR
IC16
Q33 CONTROL
Q50 CONTROL
Q36 CONTROL
CT1 14MHz ADJ
IC21(a) EXT 28MHz VCO
TP11(EXT VCO)
L20 EXT VCO
BLACK CLAMP DC DETEC
Q45,48,49 AMP
Q46 CLAMP
+5V
+9V
+1.8V

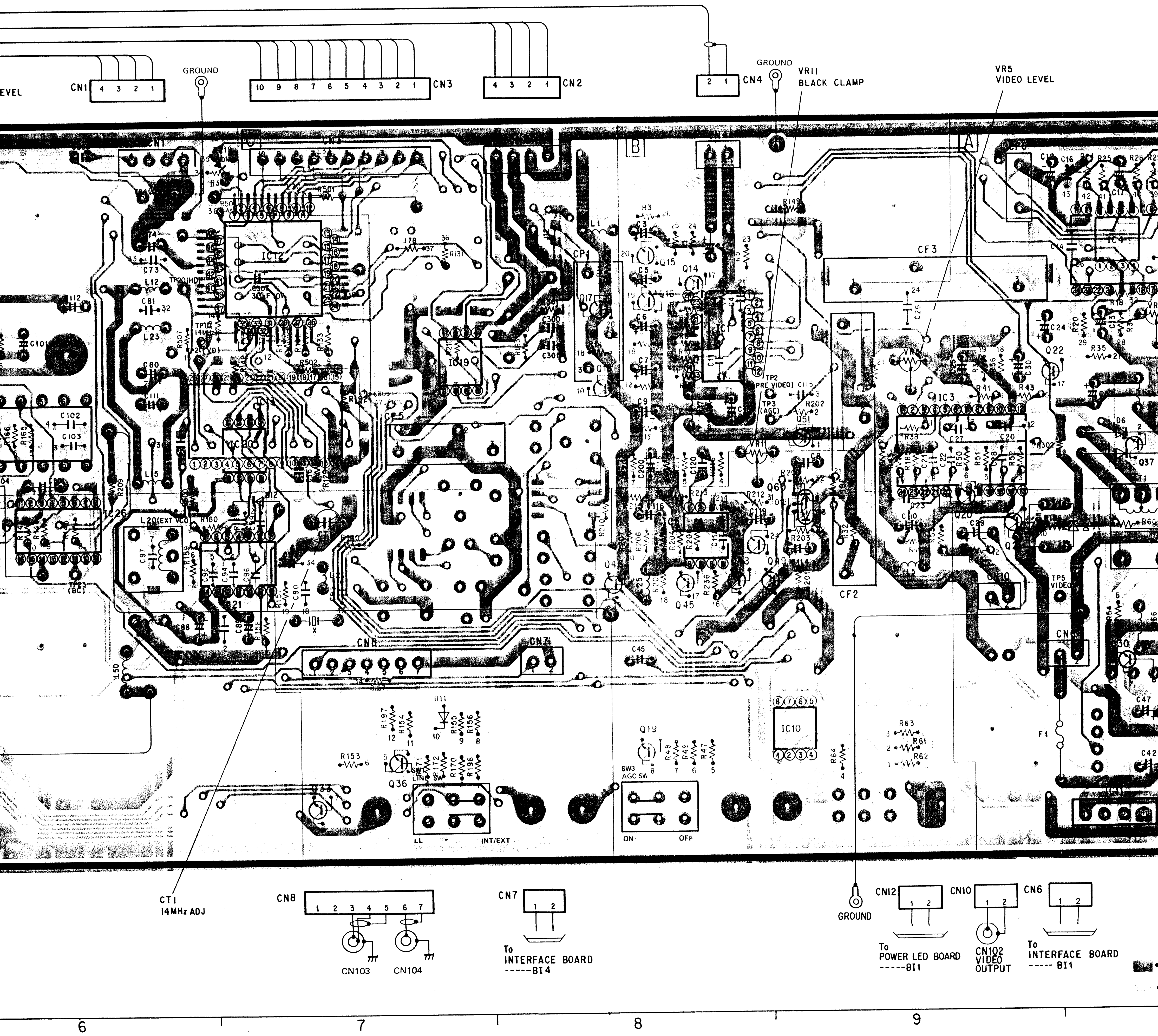
CONDUCTOR VIEW OF MAIN BOARD


MAIN BOARD
ALC BOARD
VR9
H. PHASE
VR8
ALC LEVEL
CN1
4 3 2 1
GROUND
10 9 8 7 6 5
IC7
IC12
IC17
IC18
IC16
IC15
IC20
IC25
IC21
TP8 (+5V)
TP11 (EXT VCO)
TP20 (HD)
TP10 (14MHz)
TP21 (VD)
TP23 (BC)
L20 (EXT VCO)
VR10
LINE PHASE
CT1
14MHz ADJ
CN8
1 2 3

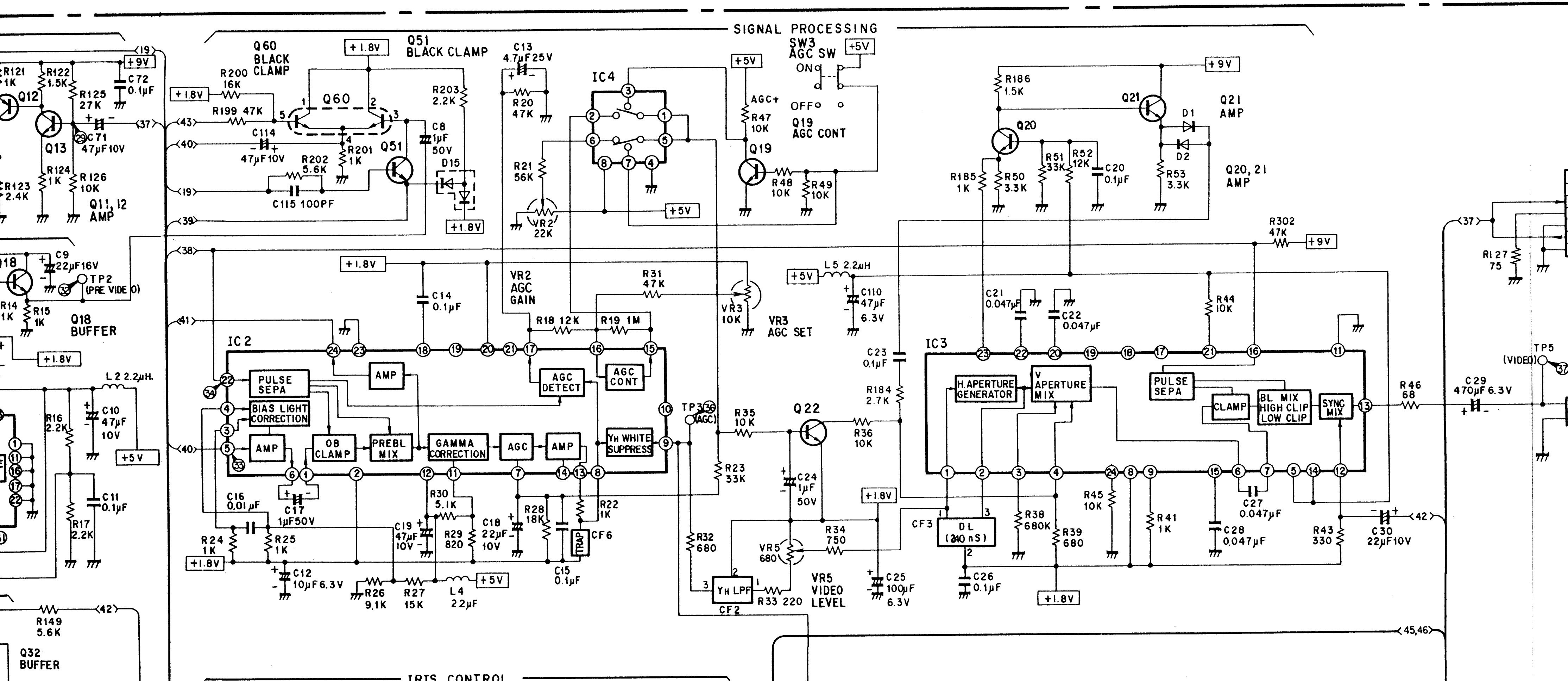
SCHEMATIC DIAGRAM OF MAIN BOARD

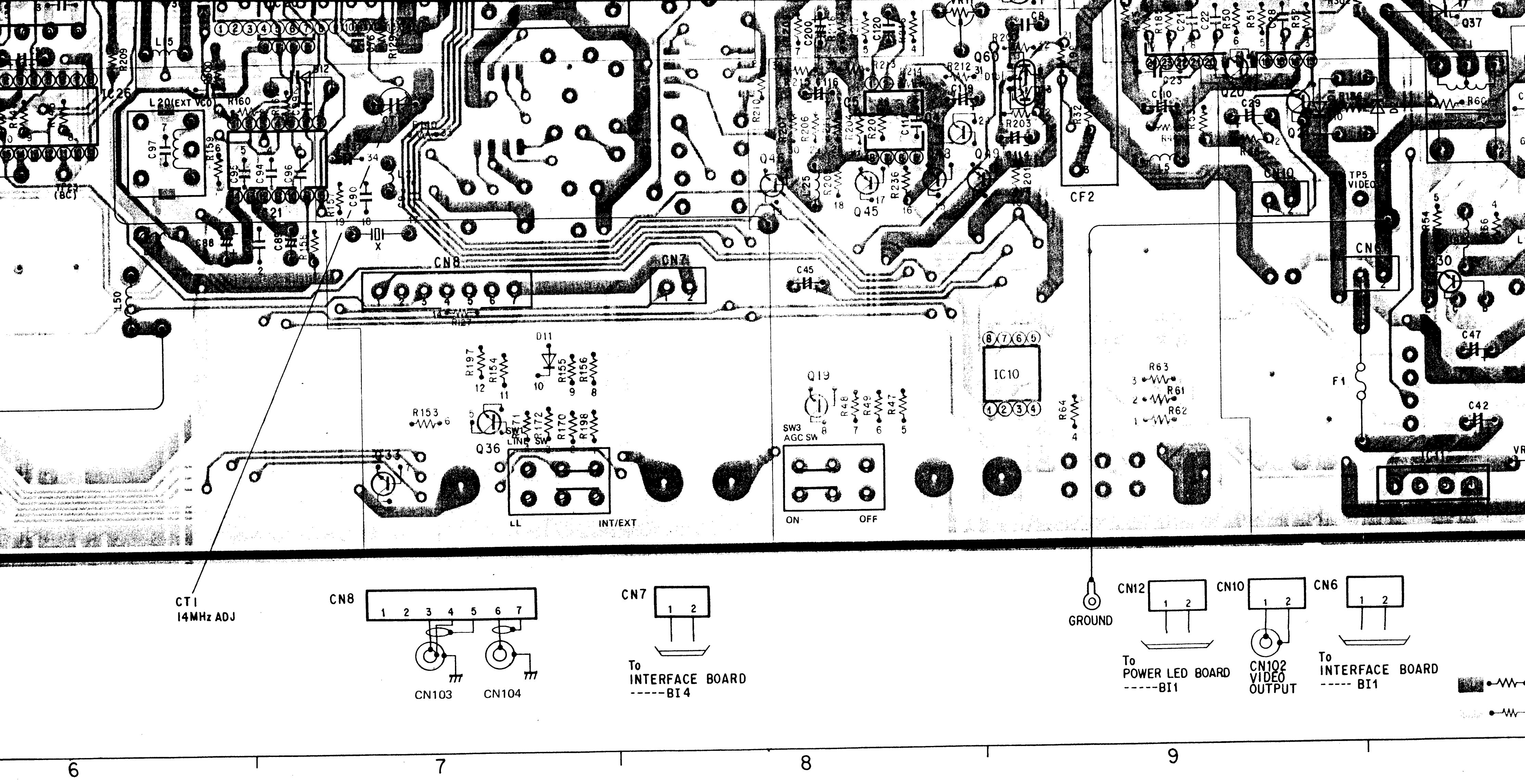

3
4
5
6
BOARD
E GENERATOR
V RESET DETECT
SYNC SEPARATION
Q1, 2 GEN LOCK DET
IC19 CLAMP P SE GEN
Q3, 4 V RESET
PULSE GENERATOR
CCD DRIVE PULSE GENERATOR
IC12
IC12 CCD DRIVE PULSE GENERATOR
Q6 SYNC SEPARATOR
Q7 AMP
Q8 CLAMP
Q9 BUFFER
Q10 SYNC SEPARATOR
Q11 BUFFER
Q11, 12 AMP
SAMPLE HOLD
CF1(9.55MHz)
LPF
Q14 AMP
Q16, 17 AMP
Q15 BUFFER
Q18 BUFFER
TP2 (PRE VIDEO)
IC1
SIGNAL DETECT
SAMPLE HOLD
CLAMP
Q38
To POWER BOARD B15
SYNC GENERATOR
IC13 SYNC GENERATOR
IC13
Q32 BUFFER
Q60 BLACK CLAMP
Q51 BLACK CLAMP
IC2
PULSE SEPA
BIAS LIGHT CORRECTION
AMP
OB CLAMP
PREBL MIX
GAMMA CORRECTION
IRIS CONTR

ARD

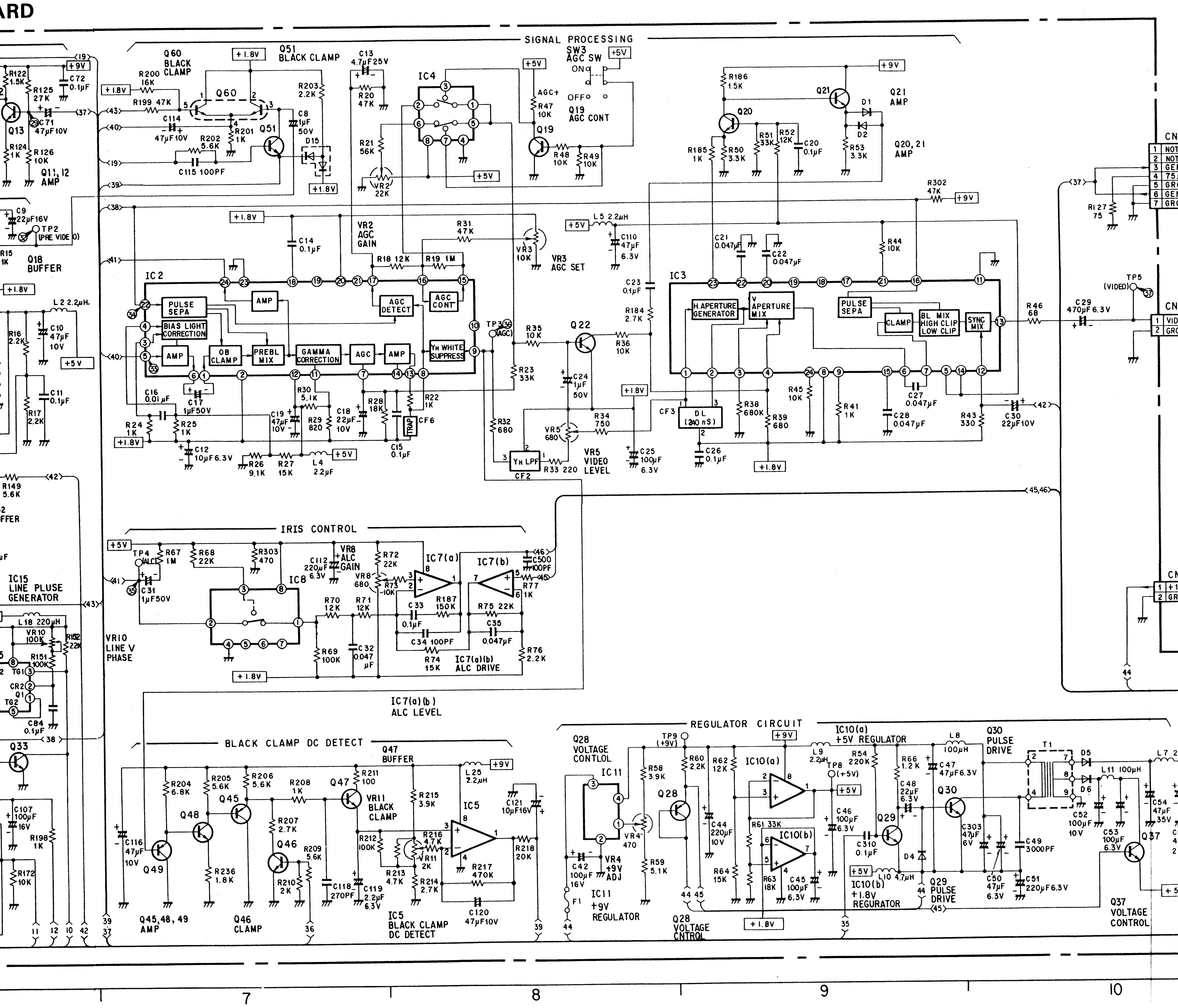

EVEL
CN1 4 3 2 1
GROUND
10 9 8 7 6 5 4 3 2 1 CN3
4 3 2 1 CN2
2 1 CN4
GROUND
VR11
BLACK CLAMP
VR5
VIDEO LEVEL
IC12
IC19
IC20
IC25
IC3
IC4
IC10
CF1
CF2
CF3
CF5
CN8
CN7
CN10
Q14
Q15
Q17
Q22
Q36
Q37
Q45
Q51
Q60
TP2 (PRE VIDEO)
TP3 (AGC)
TP5 VIDEO
TP20 (HD)
TP23 (BC)
L20 (EXT VCO)
SW3 AGC SW
ON OFF
LL INT/EXT
LINE SW
F1
CT1
14MHz ADJ
CN8 1 2 3 4 5 6 7
CN103 CN104
CN7 1 2
To
INTERFACE BOARD
-----BI4
GROUND
CN12 1 2
CN10 1 2
CN6 1 2
To
POWER LED BOARD
-----BI1
CN102
VIDEO
OUTPUT
To
INTERFACE BOARD
----- BI1
6
7
8
9

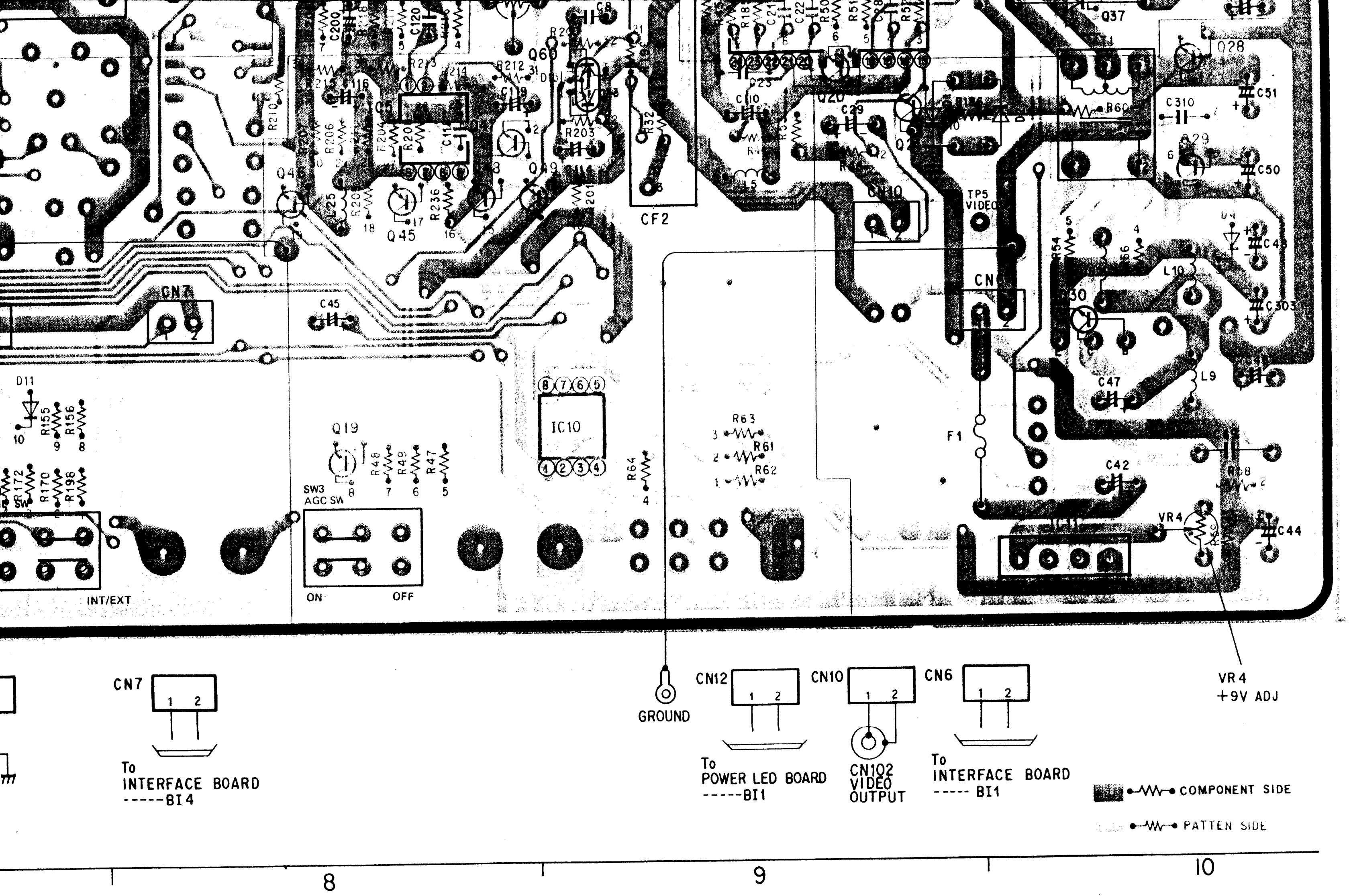
OARD

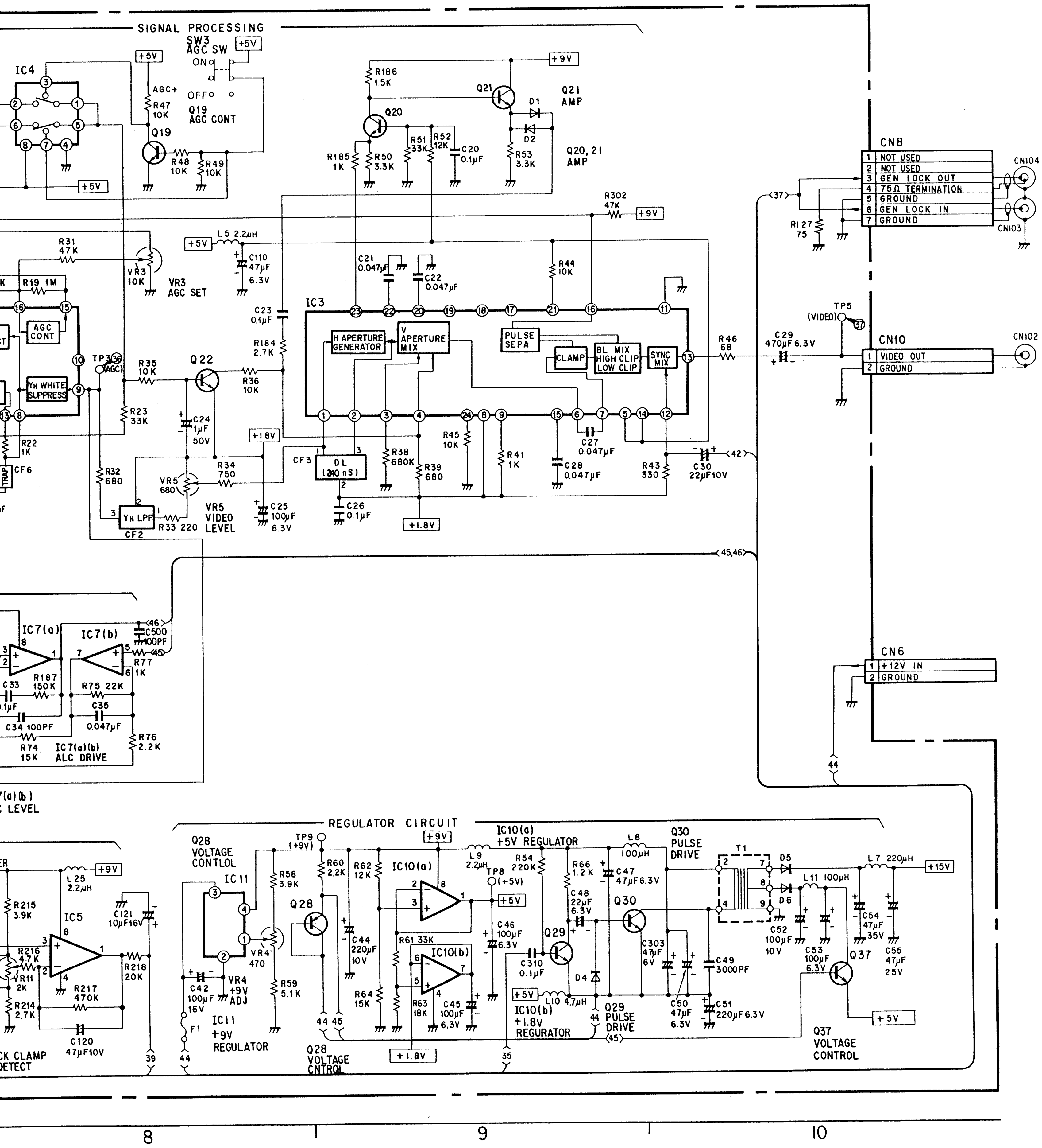

SIGNAL PROCESSING
Q60 BLACK CLAMP
Q51 BLACK CLAMP
+1.8V
R200 16K
R199 47K
C114 47μF 10V
R202 5.6K
R201 1K
C115 100PF
R203 2.2K
C8 1μF 50V
D15
C13 4.7μF 25V
R20 47K
IC4
R21 56K
VR2 22K
SW3 AGC SW
ON OFF
AGC+
R47 10K
Q19 AGC CONT
R48 10K
R49 10K
+5V
+9V
R186 1.5K
Q21
D1 D2
Q21 AMP
Q20
R185 1K
R50 3.3K
R51 33K
R52 12K
C20 0.1μF
R53 3.3K
Q20, 21 AMP
R302 47K
Q12
Q13
R121 1K
R122 1.5K
R125 27K
C72 0.1μF
C71 47μF 10V
R123 2.4K
R124 1K
R126 10K
Q11, 12 AMP
Q18
C9 22μF 16V
TP2 (PRE VIDEO)
R14 1K
R15 1K
Q18 BUFFER
L2 2.2μH
R16 2.2K
C10 47μF 10V
C11 0.1μF
R17 2.2K
R149 5.6K
Q32 BUFFER
IRIS CONTROL
C14 0.1μF
VR2 AGC GAIN
R31 47K
VR3 10K
VR3 AGC SET
R18 12K
R19 1M
IC2
PULSE SEPA
AMP
BIAS LIGHT CORRECTION
OB CLAMP
PREBL MIX
GAMMA CORRECTION
AGC
AGC DETECT
AGC CONT
YH WHITE SUPPRESS
TP3 (AGC)
C16 0.01μF
C17 1μF 50V
R24 1K
R25 1K
C12 10μF 6.3V
R26 9.1K
R27 15K
L4 22μF
R30 5.1K
C19 47μF 10V
R29 820
C18 22μF 10V
R28 18K
C15 0.1μF
R22 1K
TRAP
CF6
R35 10K
Q22
R23 33K
C24 1μF 50V
R36 10K
R32 680
VR5 680
R34 750
YH LPF
CF2
R33 220
VR5 VIDEO LEVEL
C25 100μF 6.3V
L5 2.2μH
C110 47μF 6.3V
C23 0.1μF
R184 2.7K
IC3
H.APERTURE GENERATOR
V APERTURE MIX
PULSE SEPA
CLAMP
BL MIX HIGH CLIP LOW CLIP
SYNC MIX
C21 0.047μF
C22 0.047μF
R44 10K
CF3
DL (240nS)
C26 0.1μF
R38 680K
R39 680
R45 10K
R41 1K
C28 0.047μF
C27 0.047μF
R43 330
C30 22μF 10V
R46 68
C29 470μF 6.3V
TP5 (VIDEO)
R127 75
(19) (43) (40) (39) (38) (41) (37) (42) (45,46)

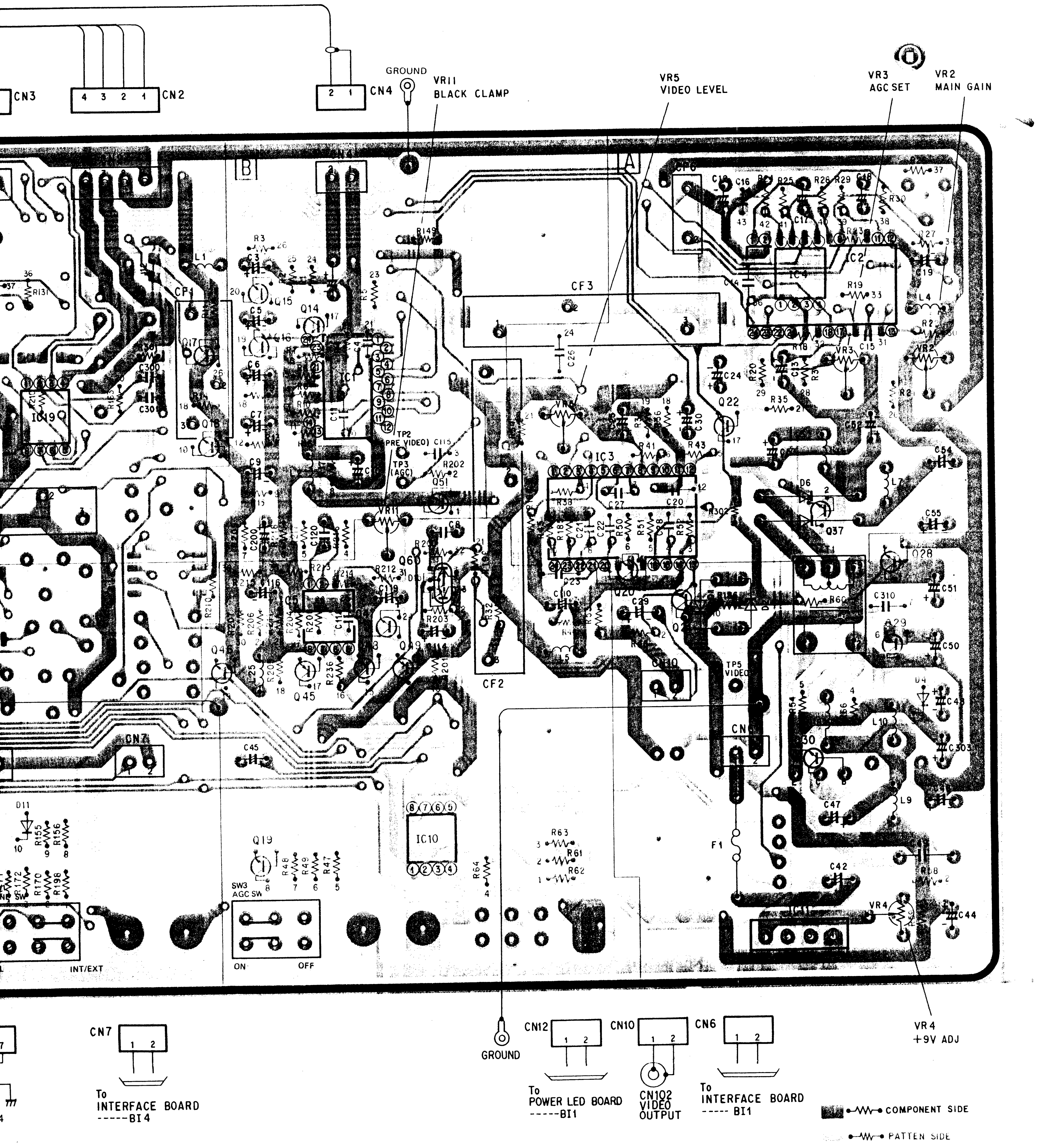

CT1
14MHz ADJ
CN8
1 2 3 4 5 6 7
CN103
CN104
CN7
1 2
To
INTERFACE BOARD
-----BI4
GROUND
CN12
1 2
To
POWER LED BOARD
-----BI1
CN10
1 2
CN102
VIDEO
OUTPUT
CN6
1 2
To
INTERFACE BOARD
----- BI1
L20(EXT VCO)
CF2
TP5
VIDEO
IC10
SW1
LINE SW
LL
INT/EXT
SW3
AGC SW
ON
OFF
Q19
Q36
Q33
F1
6
7
8
9

ARD


SIGNAL PROCESSING
Q60
BLACK
CLAMP
Q51
BLACK CLAMP
SW3
AGC SW
ON
OFF
Q19
AGC CONT
IC4
IC2
PULSE SEPA
BIAS LIGHT CORRECTION
AMP
OB CLAMP
PREBL MIX
GAMMA CORRECTION
AGC
AGC DETECT
AGC CONT
YH WHITE SUPPRESS
VR2
AGC
GAIN
VR3
AGC SET
Q22
YH LPF
CF2
VR5
VIDEO
LEVEL
IC3
H.APERTURE GENERATOR
V APERTURE MIX
PULSE SEPA
CLAMP
BL MIX HIGH CLIP LOW CLIP
SYNC MIX
DL (240 nS)
CF3
Q20
Q21
Q21
AMP
Q20, 21
AMP
TP5
(VIDEO)
Q11, 12
AMP
Q13
TP2
(PRE VIDEO)
Q18
BUFFER
IRIS CONTROL
TP4
(ALC)
IC8
VR8
ALC
GAIN
IC7(a)
IC7(b)
IC7(a)(b)
ALC DRIVE
IC7(a)(b)
ALC LEVEL
VR10
LINE V
PHASE
IC15
LINE PLUSE
GENERATOR
BLACK CLAMP DC DETECT
Q47
BUFFER
VR11
BLACK
CLAMP
IC5
IC5
BLACK CLAMP
DC DETECT
Q45, 48, 49
AMP
Q46
CLAMP
Q33
REGULATOR CIRCUIT
Q28
VOLTAGE
CONTLOL
TP9
(+9V)
IC11
VR4
+9V
ADJ
IC11
+9V
REGULATOR
Q28
VOLTAGE
CNTROL
IC10(a)
+5V REGULATOR
IC10(b)
+1.8V
REGURATOR
TP8
(+5V)
Q29
PULSE
DRIVE
Q30
PULSE
DRIVE
T1
Q37
VOLTAGE
CONTROL
+9V
+5V
+1.8V
7
8
9
10

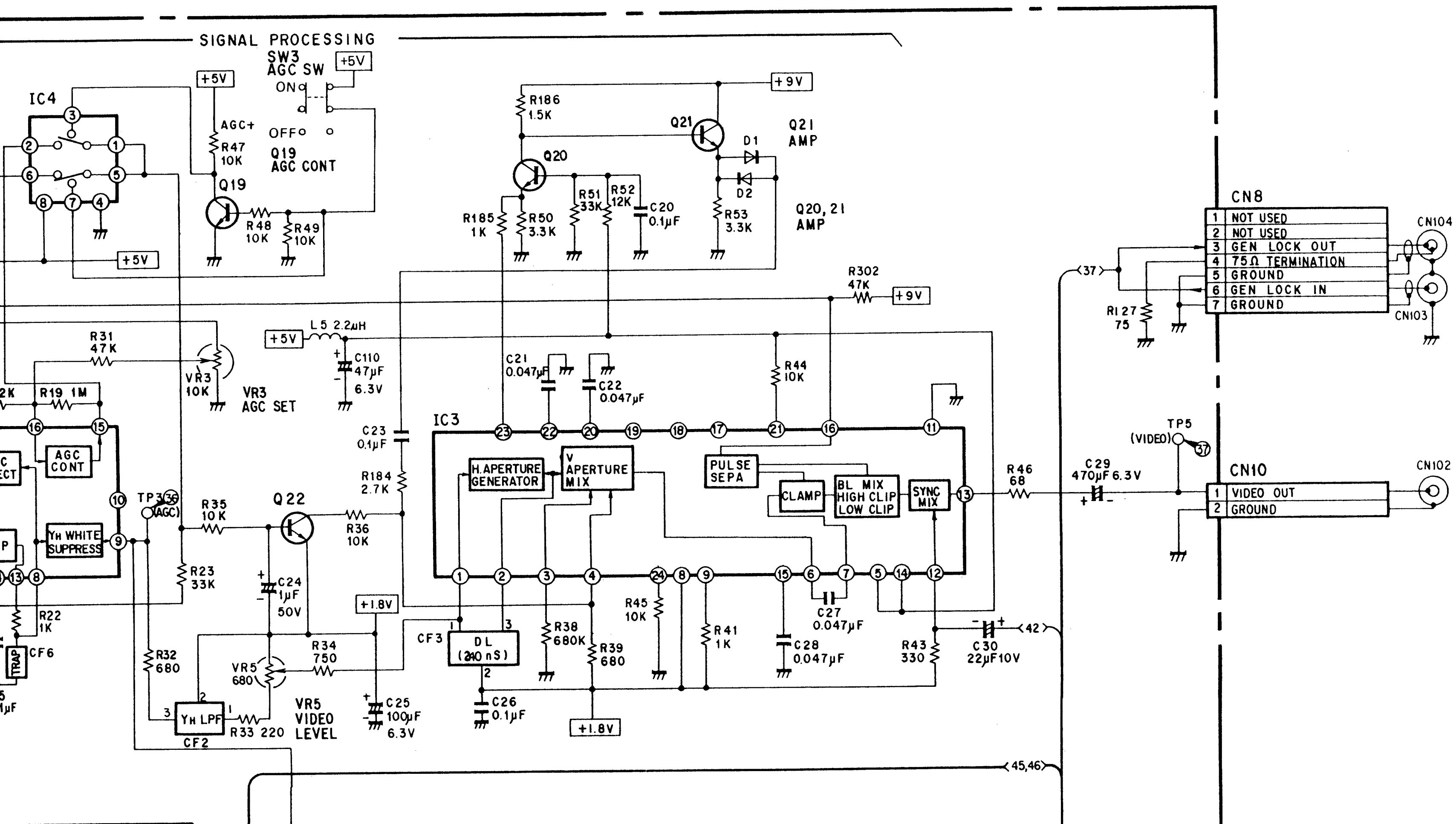

CN7
To INTERFACE BOARD -----BI4
GROUND
CN12
To POWER LED BOARD -----BI1
CN10
CN102 VIDEO OUTPUT
CN6
To INTERFACE BOARD ----- BI1
VR4 +9V ADJ
COMPONENT SIDE
PATTEN SIDE
SW3 AGC SW
ON
OFF
INT/EXT
IC10
Q19
CF2
TP5 VIDEO
F1
IC11
8
9
10


SIGNAL PROCESSING
SW3 AGC SW
Q19 AGC CONT
IC4
Q21 AMP
Q20, 21 AMP
VR3 AGC SET
IC3
H.APERTURE GENERATOR
V APERTURE MIX
PULSE SEPA
CLAMP
BL MIX HIGH CLIP LOW CLIP
SYNC MIX
AGC CONT
YH WHITE SUPPRESS
Q22
VR5 VIDEO LEVEL
YH LPF
CF2
CF3
DL (240nS)
TP3 (AGC)
TP5 (VIDEO)
CN8
1 NOT USED
2 NOT USED
3 GEN LOCK OUT
4 75Ω TERMINATION
5 GROUND
6 GEN LOCK IN
7 GROUND
CN104
CN103
CN10
1 VIDEO OUT
2 GROUND
CN102
CN6
1 +12V IN
2 GROUND
IC7(a)
IC7(b)
IC7(a)(b) ALC DRIVE
IC7(a)(b) LEVEL
REGULATOR CIRCUIT
Q28 VOLTAGE CONTLOL
IC11 +9V REGULATOR
Q28 VOLTAGE CNTROL
IC10(a) +5V REGULATOR
IC10(b) +1.8V REGURATOR
Q29 PULSE DRIVE
Q30 PULSE DRIVE
T1
Q37 VOLTAGE CONTROL
VR4 +9V ADJ
TP8 (+5V)
TP9 (+9V)
IC5
CLAMP DETECT
+5V
+9V
+1.8V
+15V
8
9
10



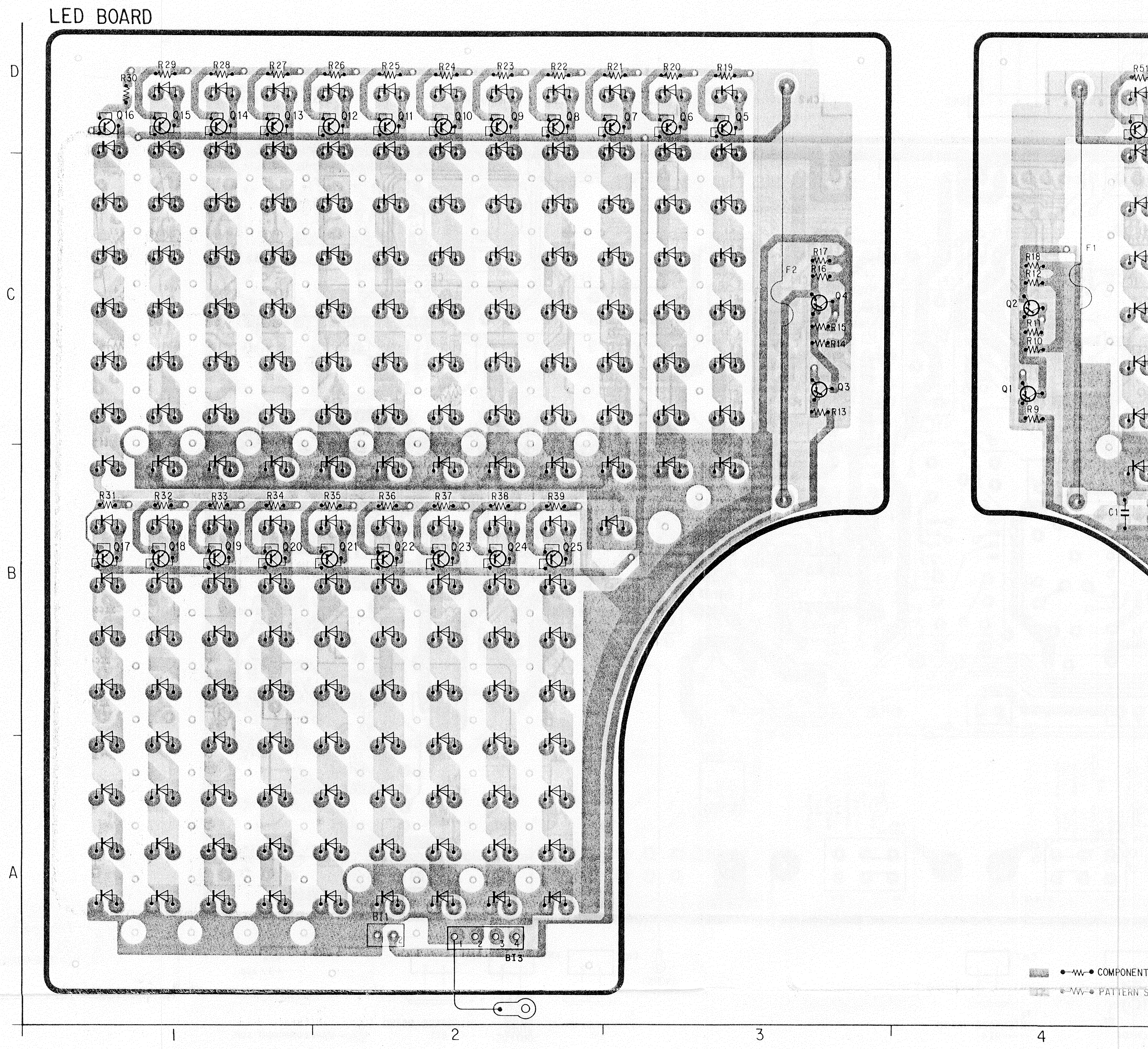
CN3
CN2
CN4
GROUND
VR11 BLACK CLAMP
VR5 VIDEO LEVEL
VR3 AGC SET
VR2 MAIN GAIN
CF3
CF2
IC3
IC2
IC19
IC10
IC11
TP2 (PRE VIDEO)
TP3 (AGC)
TP5 VIDEO
SW3 AGC SW
ON
OFF
INT/EXT
F1
VR4 +9V ADJ
CN7
To INTERFACE BOARD -----BI4
CN12
CN10
CN6
To POWER LED BOARD -----BI1
CN102 VIDEO OUTPUT
To INTERFACE BOARD ----- BI1
COMPONENT SIDE
PATTEN SIDE

8 9 10



SIGNAL PROCESSING
SW3 AGC SW
+5V
ON
OFF
AGC+
R47 10K
Q19 AGC CONT
Q19
R48 10K
R49 10K
IC4
R186 1.5K
+9V
Q21
Q21 AMP
D1
D2
Q20
R185 1K
R50 3.3K
R51 33K
R52 12K
C20 0.1μF
R53 3.3K
Q20, 21 AMP
R302 47K
R31 47K
VR3 10K
VR3 AGC SET
L5 2.2μH
C110 47μF 6.3V
C21 0.047μF
C22 0.047μF
R44 10K
R19 1M
AGC CONT
C23 0.1μF
R184 2.7K
IC3
H.APERTURE GENERATOR
V APERTURE MIX
PULSE SEPA
CLAMP
BL MIX HIGH CLIP LOW CLIP
SYNC MIX
YH WHITE SUPPRESS
TP3 (AGC)
R35 10K
Q22
R36 10K
R23 33K
C24 1μF 50V
R22 1K
CF6
R32 680
VR5 680
R34 750
+1.8V
C25 100μF 6.3V
YH LPF
CF2
R33 220
VR5 VIDEO LEVEL
CF3
DL (240nS)
C26 0.1μF
R38 680K
R39 680
R45 10K
R41 1K
C28 0.047μF
C27 0.047μF
R43 330
C30 22μF 10V
R46 68
C29 470μF 6.3V
TP5 (VIDEO)
CN8
1 NOT USED
2 NOT USED
3 GEN LOCK OUT
4 75Ω TERMINATION
5 GROUND
6 GEN LOCK IN
7 GROUND
CN104
CN103
R127 75
CN10
1 VIDEO OUT
2 GROUND
CN102

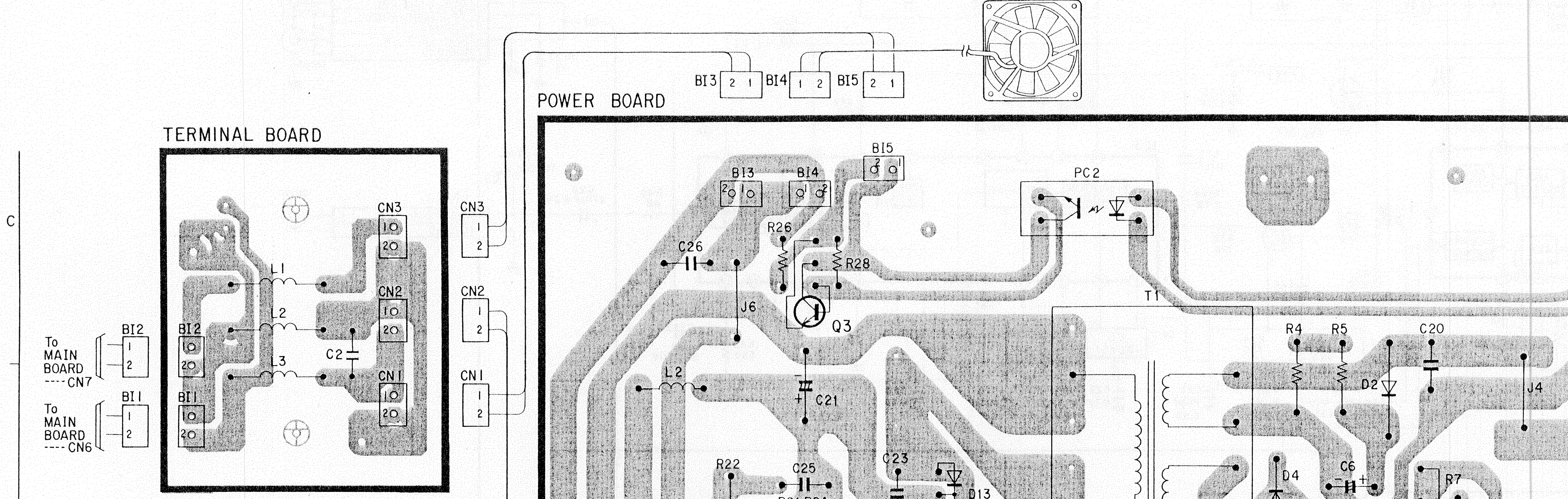
CONDUCTOR VIEW OF LED BOARD

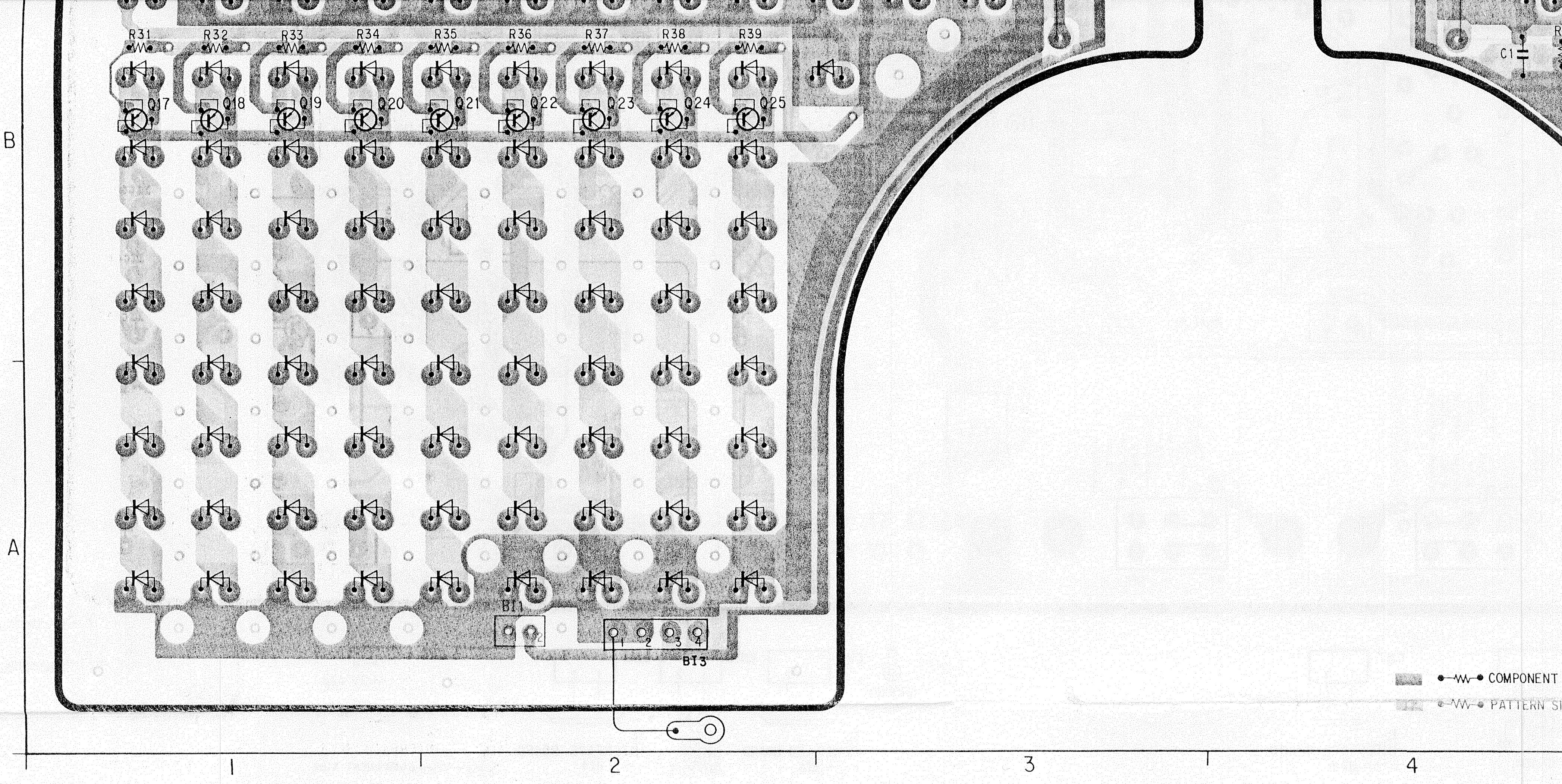

LED BOARD
D
C
B
A
1
2
3
4
R29
R28
R27
R26
R25
R24
R23
R22
R21
R20
R19
R30
Q16
Q15
Q14
Q13
Q12
Q11
Q10
Q9
Q8
Q7
Q6
Q5
R17
R16
F2
Q4
R15
R14
Q3
R13
R31
R32
R33
R34
R35
R36
R37
R38
R39
Q17
Q18
Q19
Q20
Q21
Q22
Q23
Q24
Q25
BI1
BI3
R51
F1
R18
R12
Q2
R11
R10
Q1
R9
C1
COMPONENT
PATTERN S

LED BOARD

IC1	NJM2903M		B5	Q9	2SB709-Q	(A)	D2	Q18	2SB709-Q	(A)	B1	Q27	2SB709-Q	(A)	D6	Q36	2SB709-Q	(A)	D5	Q45	2SB709-
Q1	2SB709-Q	(A)	C4	Q10	2SB709-Q	(A)	D2	Q19	2SB709-Q	(A)	B1	Q28	2SB709-Q	(A)	D6	Q37	2SB709-Q	(A)	D4	D1-328	YWSE10
Q2	2SD601-QR	(Y)	C4	Q11	2SB709-Q	(A)	D2	Q20	2SB709-Q	(A)	B1	Q29	2SB709-Q	(A)	D6	Q38	2SB709-Q	(A)	B6		
Q3	2SB709-Q	(A)	C3	Q12	2SB709-Q	(A)	D2	Q21	2SB709-Q	(A)	B2	Q30	2SB709-Q	(A)	D6	Q39	2SB709-Q	(A)	B6		
Q4	2SD601-QR	(Y)	C3	Q13	2SB709-Q	(A)	D1	Q22	2SB709-Q	(A)	B2	Q31	2SB709-Q	(A)	D5	Q40	2SB709-Q	(A)	B6		
Q5	2SB709-Q	(A)	D3	Q14	2SB709-Q	(A)	D1	Q23	2SB709-Q	(A)	B2	Q32	2SB709-Q	(A)	D5	Q41	2SB709-Q	(A)	B6		
Q6	2SB709-Q	(A)	D3	Q15	2SB709-Q	(A)	D1	Q24	2SB709-Q	(A)	B2	Q33	2SB709-Q	(A)	D5	Q42	2SB709-Q	(A)	B6		
Q7	2SB709-Q	(A)	D3	Q16	2SB709-Q	(A)	D1	Q25	2SB709-Q	(A)	B2	Q34	2SB709-Q	(A)	D5	Q43	2SB709-Q	(A)	B5		
Q8	2SB709-Q	(A)	D2	Q17	2SB709-Q	(A)	B1	Q26	2SB709-Q	(A)	D6	Q35	2SB709-Q	(A)	D5	Q44	2SB709-Q	(A)	B5		

CONDUCTOR VIEW OF POWER BOA

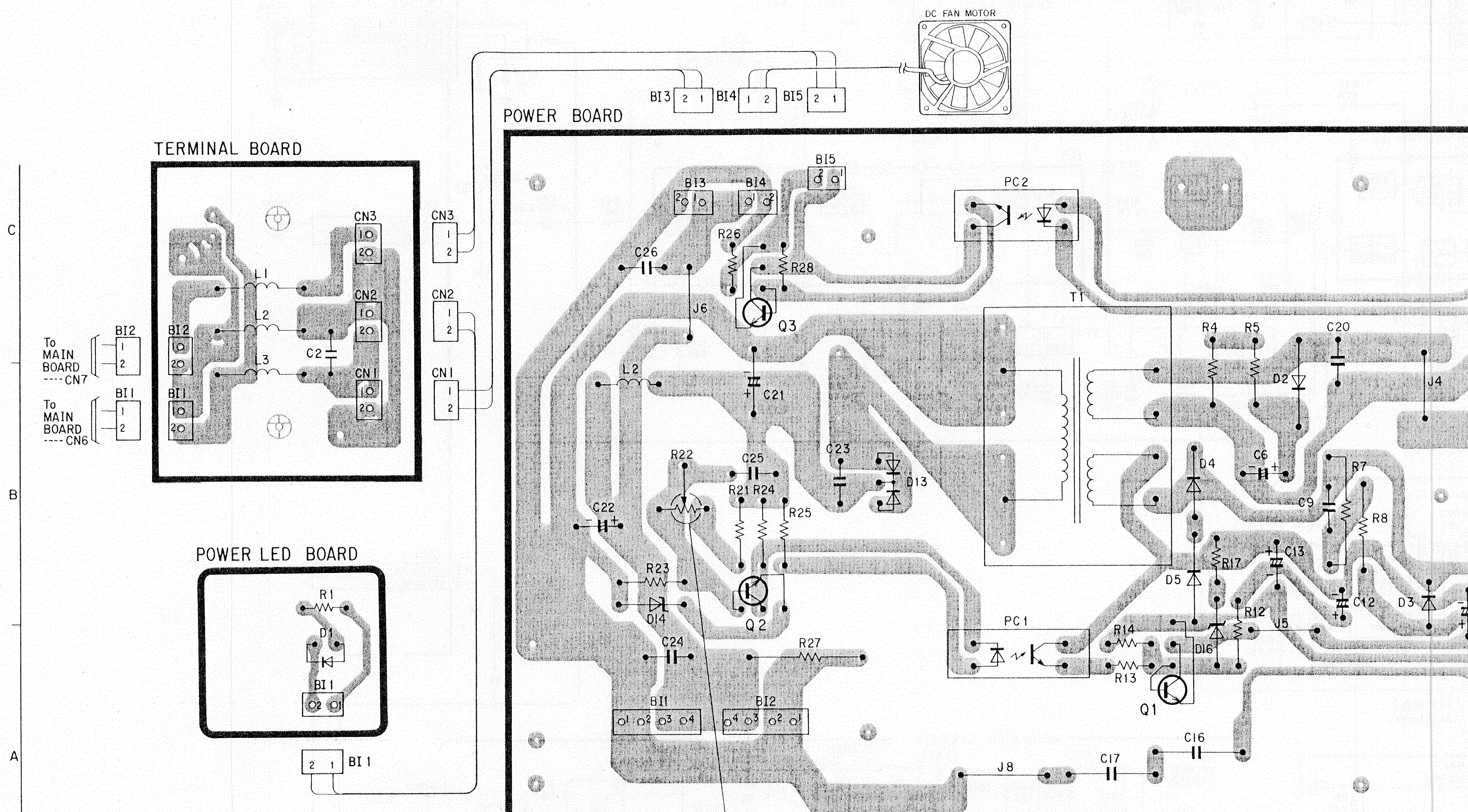

DC FAN MOTOR
BI3
BI4
BI5
POWER BOARD
TERMINAL BOARD
C
CN3
CN2
CN1
L1
L2
L3
C2
BI2
BI1
To MAIN BOARD ----CN7
To MAIN BOARD ----CN6
BI5
BI3
BI4
PC2
C26
R26
R28
Q3
J6
L2
C21
T1
R4
R5
C20
D2
J4
R22
C25
C23
D13
D4
C6
R7


R31
R32
R33
R34
R35
R36
R37
R38
R39
Q17
Q18
Q19
Q20
Q21
Q22
Q23
Q24
Q25
C1
B
A
BI1
1
2
3
4
BI3
COMPONENT
PATTERN S
1
2
3
4

LED BOARD

IC1	NJM2903M		B5
Q1	2SB709-Q	(A)	C4
Q2	2SD601-QR	(Y)	C4
Q3	2SB709-Q	(A)	C3
Q4	2SD601-QR	(Y)	C3
Q5	2SB709-Q	(A)	D3
Q6	2SB709-Q	(A)	D3
Q7	2SB709-Q	(A)	D3
Q8	2SB709-Q	(A)	D2
Q9	2SB709-Q	(A)	D2
Q10	2SB709-Q	(A)	D2
Q11	2SB709-Q	(A)	D2
Q12	2SB709-Q	(A)	D2
Q13	2SB709-Q	(A)	D1
Q14	2SB709-Q	(A)	D1
Q15	2SB709-Q	(A)	D1
Q16	2SB709-Q	(A)	D1
Q17	2SB709-Q	(A)	B1
Q18	2SB709-Q	(A)	B1
Q19	2SB709-Q	(A)	B1
Q20	2SB709-Q	(A)	B1
Q21	2SB709-Q	(A)	B2
Q22	2SB709-Q	(A)	B2
Q23	2SB709-Q	(A)	B2
Q24	2SB709-Q	(A)	B2
Q25	2SB709-Q	(A)	B2
Q26	2SB709-Q	(A)	D6
Q27	2SB709-Q	(A)	D6
Q28	2SB709-Q	(A)	D6
Q29	2SB709-Q	(A)	D6
Q30	2SB709-Q	(A)	D6
Q31	2SB709-Q	(A)	D5
Q32	2SB709-Q	(A)	D5
Q33	2SB709-Q	(A)	D5
Q34	2SB709-Q	(A)	D5
Q35	2SB709-Q	(A)	D5
Q36	2SB709-Q	(A)	D5
Q37	2SB709-Q	(A)	D4
Q38	2SB709-Q	(A)	B6
Q39	2SB709-Q	(A)	B6
Q40	2SB709-Q	(A)	B6
Q41	2SB709-Q	(A)	B6
Q42	2SB709-Q	(A)	B6
Q43	2SB709-Q	(A)	B5
Q44	2SB709-Q	(A)	B5
Q45	2SB709-		
D1-328	YWSE100		

CONDUCTOR VIEW OF POWER BOA

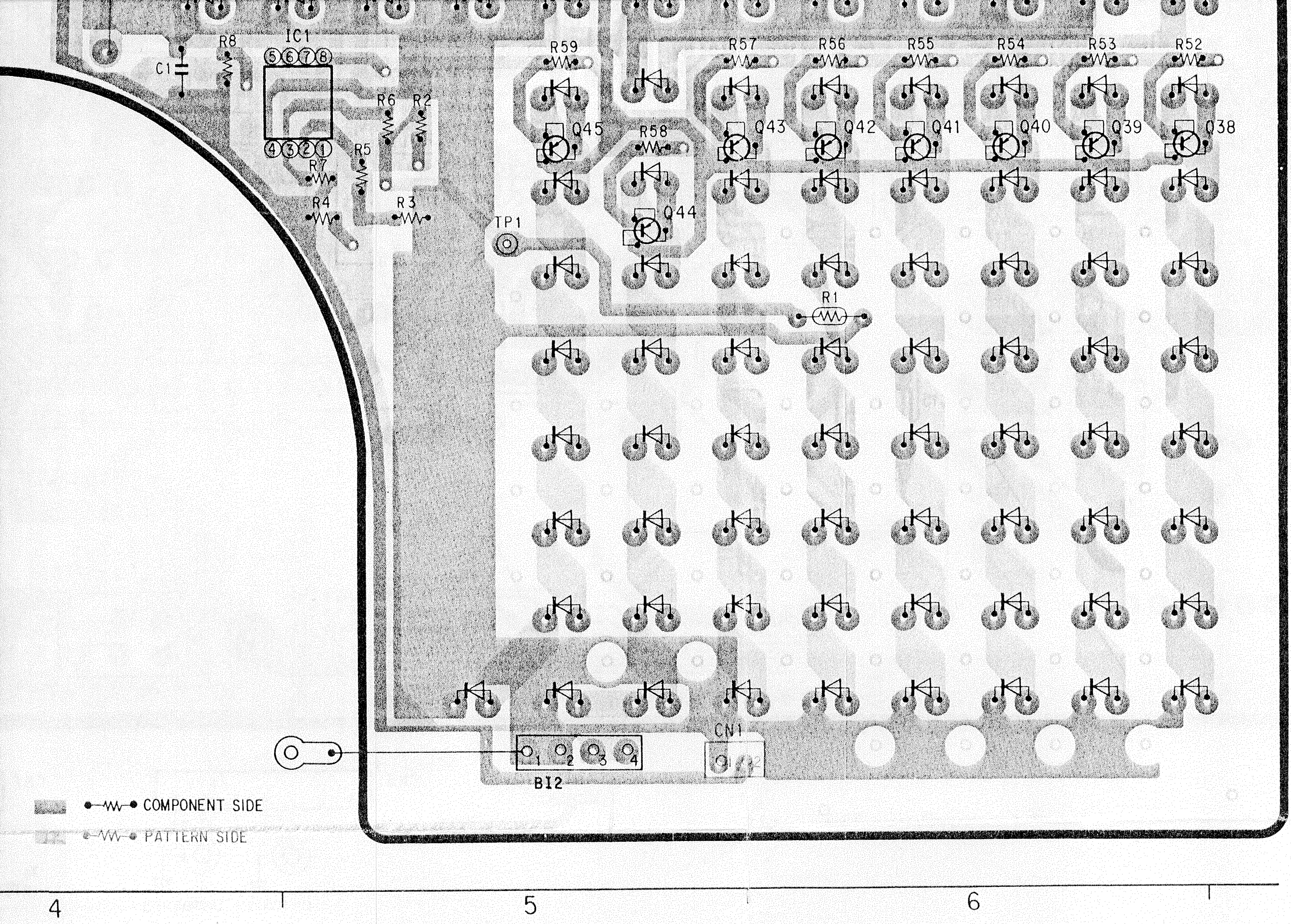

DC FAN MOTOR
BI3
BI4
BI5
POWER BOARD
TERMINAL BOARD
CN3
CN2
CN1
L1
L2
L3
C2
BI2
BI1
To MAIN BOARD ----CN7
To MAIN BOARD ----CN6
POWER LED BOARD
R1
D1
BI1
PC2
PC1
T1
C26
R26
R28
Q3
J6
L2
C21
R22
C25
R21
R24
R25
C23
D13
C22
R23
D14
Q2
C24
R27
BI1
BI2
R4
R5
C20
D2
J4
D4
C6
R7
C9
R8
R17
C13
D5
R12
C12
D3
R14
R13
D16
J5
Q1
C16
C17
J8
R22
+12V ADJ
C
B
A
1
2
3
4
5

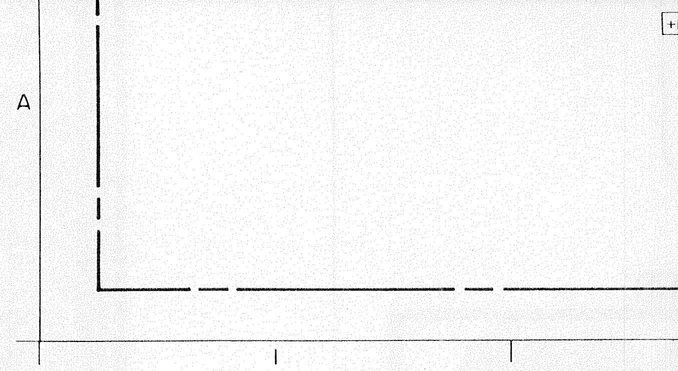
POWER LED BOARD

D1	LN238RPH	A2

POWER BOARD

IC1	YWSTR11006-S	B7
Q1	1SC2001-K	A5
Q2	1SC2001-K	B3
Q3	2SC828A-ST	C3
D1	YWD2SB60	A8
D2	RU1P	B5
D3	1SS55	B6
D4	1SS133	B5
D5	1SS133	B5
D6	1SS55	A6
D7	YWERA81-004	A6
D8	1SS55	A7
D10	YWSV03YS	B7
D11	YW10E1N	B7
D12	TW10E-6	B8
D13	YWD4SC6M	B4
D14	RD6.2EB1	B3
D15	1SS55	B7
D16	YWRD5.6EB1	A5

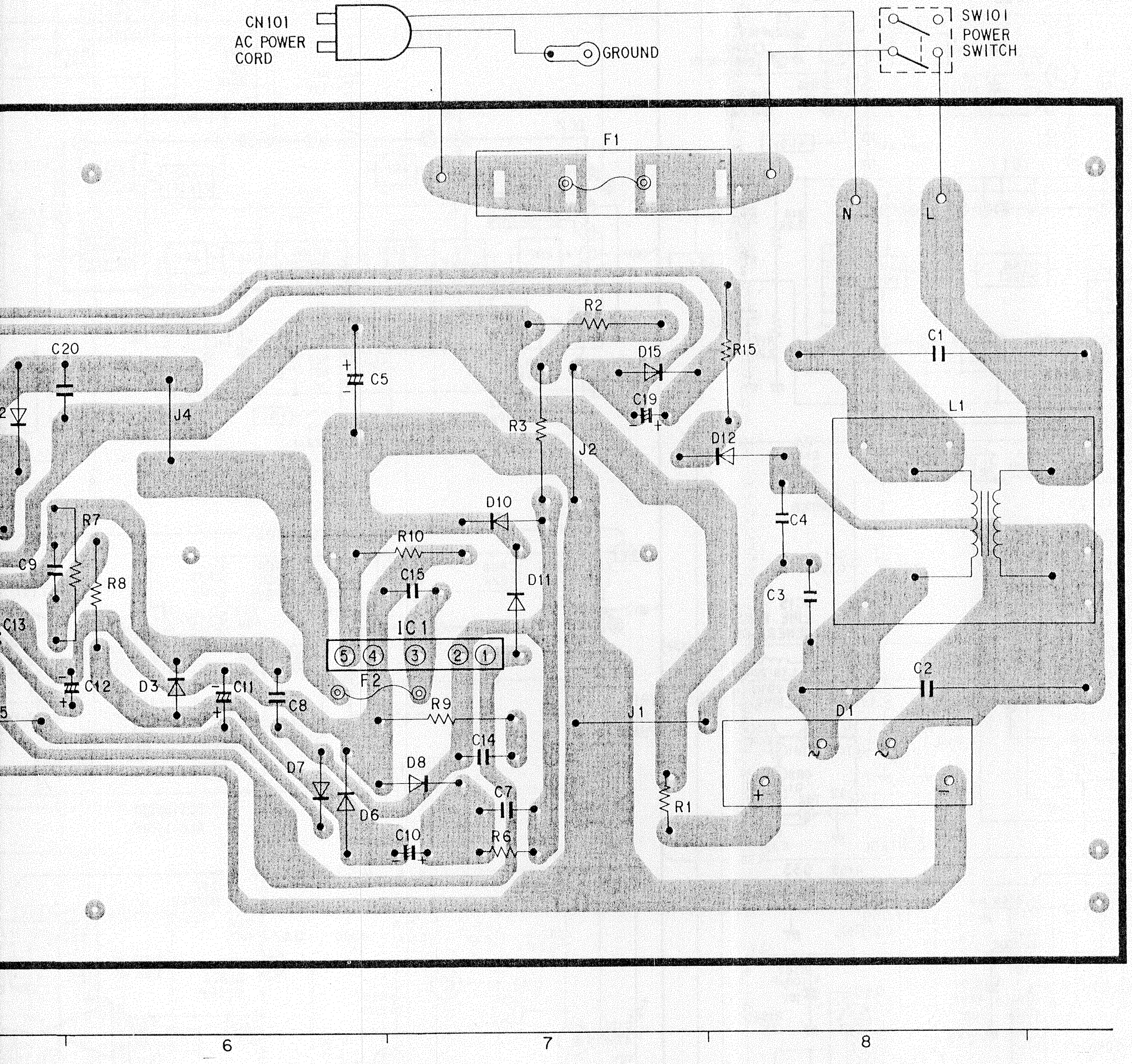

C1
R8
IC1
R59
R57
R56
R55
R54
R53
R52
Q45
R58
Q43
Q42
Q41
Q40
Q39
Q38
R6
R2
R5
R7
R4
R3
Q44
TP1
R1
CN1
B12
COMPONENT SIDE
PATTERN SIDE
4
5
6

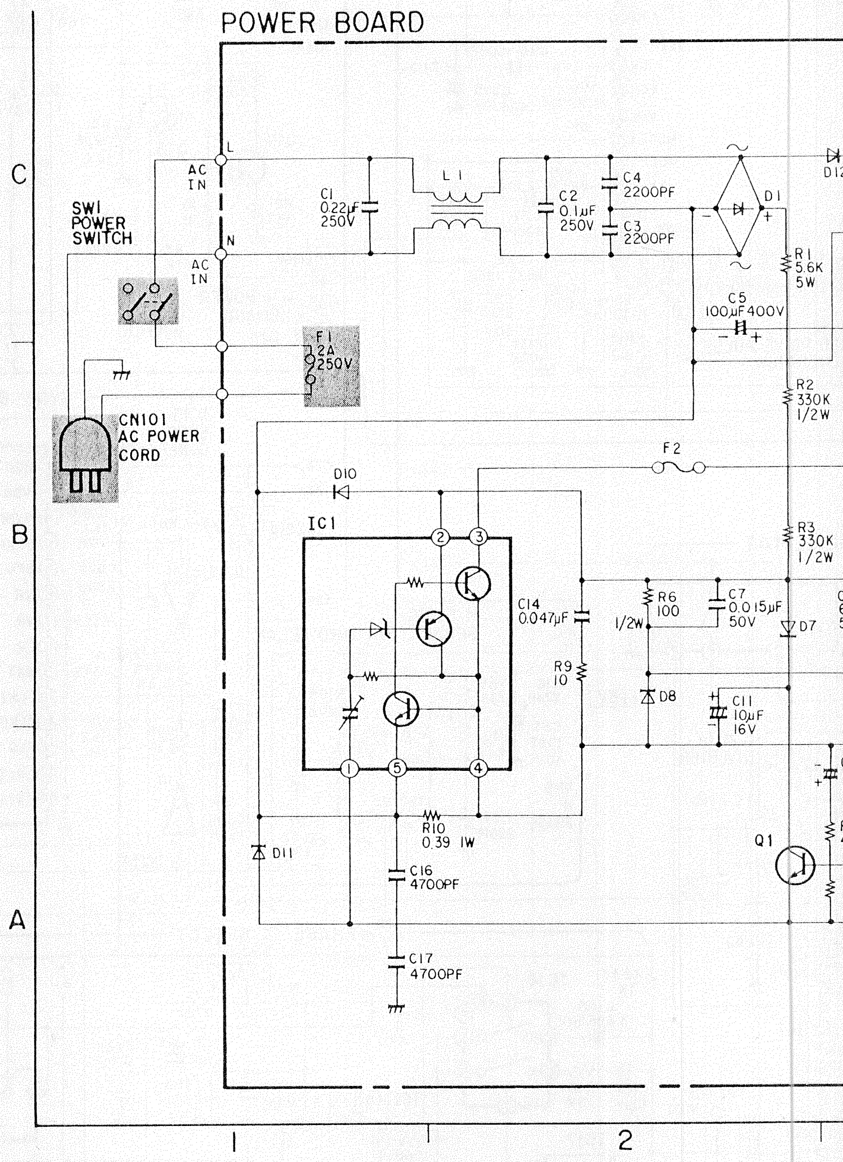


LED BOARD

IC1	NJM2903M		B3
Q1	2SB709-Q	(A)	B4
Q2	2SD601-QR	(Y)	B4
Q3	2SB709-Q	(A)	B1
Q4	2SD601-QR	(Y)	B1
Q5	2SB709-Q	(A)	B1
Q6	2SB709-Q	(A)	B2
Q7	2SB709-Q	(A)	B2
Q8	2SB709-Q	(A)	B2
Q9	2SB709-Q	(A)	B2
Q10	2SB709-Q	(A)	B2
Q11	2SB709-Q	(A)	B2
Q12	2SB709-Q	(A)	B2
Q13	2SB709-Q	(A)	B2
Q14	2SB709-Q	(A)	B2
Q15	2SB709-Q	(A)	B2
Q16	2SB709-Q	(A)	B2
Q17	2SB709-Q	(A)	B2
Q18	2SB709-Q	(A)	B2
Q19	2SB709-Q	(A)	B2
Q20	2SB709-Q	(A)	B2
Q21	2SB709-Q	(A)	B2
Q22	2SB709-Q	(A)	B2
Q23	2SB709-Q	(A)	B2
Q24	2SB709-Q	(A)	B2
Q25	2SB709-Q	(A)	B2
Q26	2SB709-Q	(A)	B5
Q27	2SB709-Q	(A)	B5
Q28	2SB709-Q	(A)	B5
Q29	2SB709-Q	(A)	B5
Q30	2SB709-Q	(A)	B5
Q31	2SB709-Q	(A)	B5
Q32	2SB709-Q	(A)	B5
Q33	2SB709-Q	(A)	B5
Q34	2SB709-Q	(A)	B5
Q35	2SB709-Q	(A)	B5
Q36	2SB709-Q	(A)	B5
Q37	2SB709-Q	(A)	B5
Q45	2SB709-Q	(A)	B5
D1-328	YWSE1003ZT		

POWER BOARD


CN101
AC POWER
CORD
GROUND
SW101
POWER
SWITCH
F1
N
L
C20
C5
J4
R2
R15
D15
C1
C19
R3
J2
D12
L1
D10
C4
R7
R10
C9
R8
C15
D11
C3
C13
IC1
5 4 3 2 1
C12
D3
C11
C8
F2
R9
C2
J1
D1
C14
D7
D8
D6
C7
R1
C10
R6
6
7
8


POWER BOARD
C
B
A
SW1
POWER
SWITCH
AC IN
L
N
C1 0.22μF 250V
L1
C2 0.1μF 250V
C4 2200PF
C3 2200PF
D1
D12
R1 5.6K 5W
C5 100μF 400V
F1 2A 250V
CN101
AC POWER
CORD
R2 330K 1/2W
F2
D10
IC1
R3 330K 1/2W
C14 0.047μF
R6 100
1/2W
C7 0.015μF 50V
D7
R9 10
D8
C11 10μF 16V
R10 0.39 1W
D11
C16 4700PF
C17 4700PF
Q1
1
2

	IC1
Pin 1	-46.5
2	-42.7
3	114.1
4	-42.8
5	-42.8

	Q1	Q2	Q3
B	-45.9	6.6	0
C	-42.6	9.4	0
E	-46.6	6.0	0

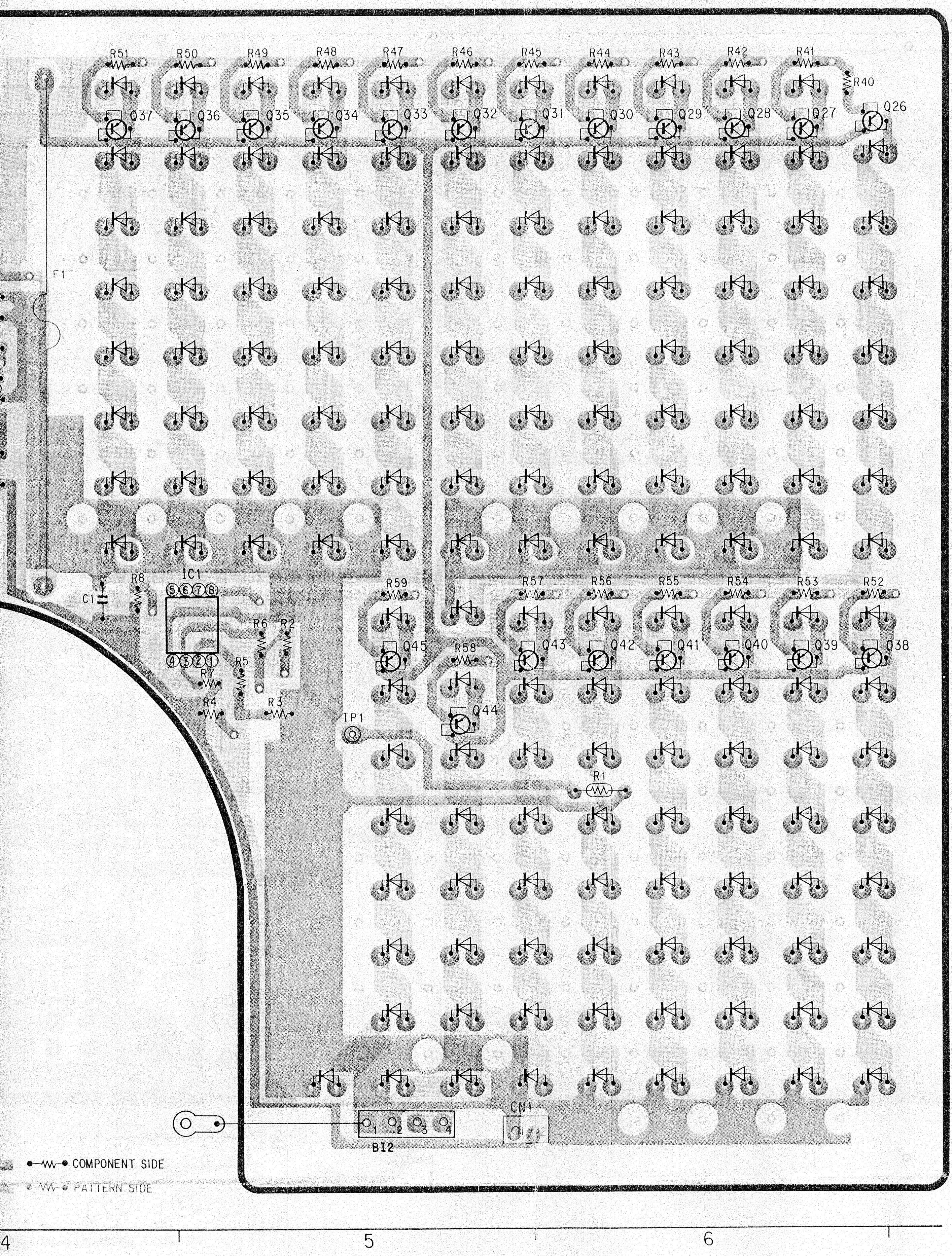
POWER LED BOARD

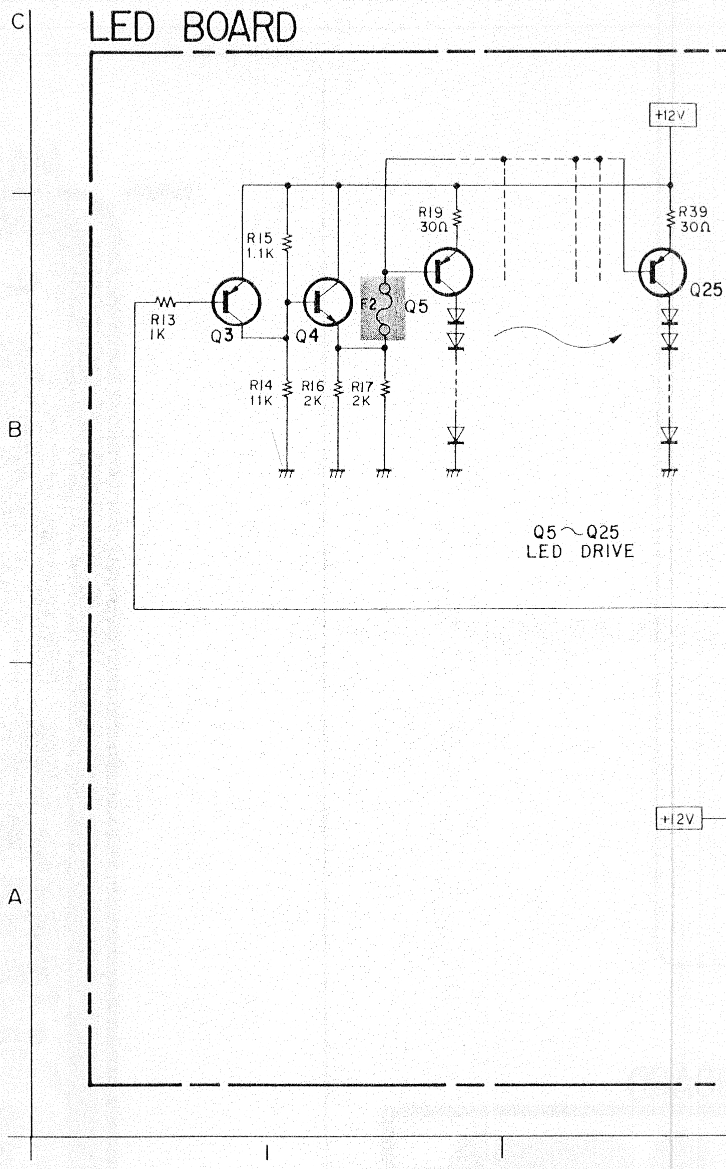
D1	LN238RPH	A6

POWER BOARD

IC1	YWSTR11006-S	B1
Q1	1SC2001-K	A2
Q2	1SC2001-K	A4
Q3	2SC828A-ST	C4
D1	YWD2SB60	C2
D2	RU1P	B3
D3	1SS55	
D4	1SS133	
D5	1SS133	
D6	1SS55	
D7	YWERA81	
D8	1SS55	

BOARD


R51
R50
R49
R48
R47
R46
R45
R44
R43
R42
R41
R40
Q37
Q36
Q35
Q34
Q33
Q32
Q31
Q30
Q29
Q28
Q27
Q26
F1
C1
R8
IC1
⑤⑥⑦⑧
④③②①
R6
R2
R5
R7
R4
R3
R59
R57
R56
R55
R54
R53
R52
Q45
R58
Q43
Q42
Q41
Q40
Q39
Q38
Q44
TP1
R1
CN1
B12
1 2 3 4
COMPONENT SIDE
PATTERN SIDE
4
5
6


C
B
A
LED BOARD
+12V
R15 1.1K
R19 30Ω
R39 30Ω
R13 1K
Q3
Q4
F2
Q5
Q25
R14 11K
R16 2K
R17 2K
Q5〜Q25 LED DRIVE
+12V

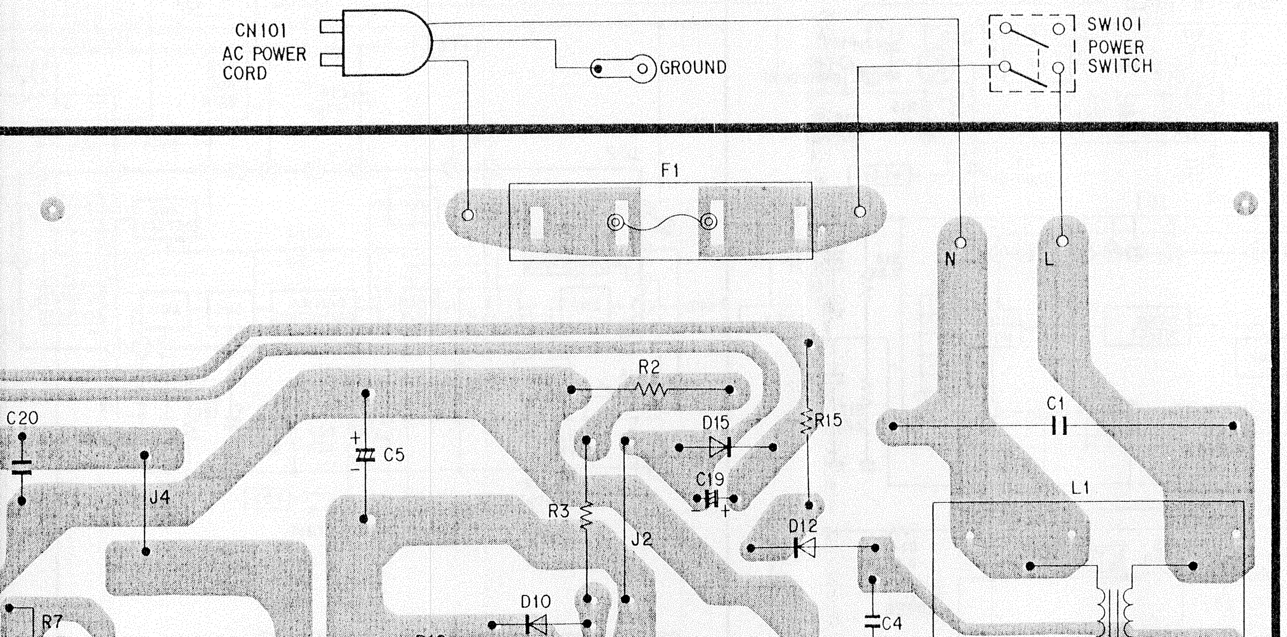
LED BOARD

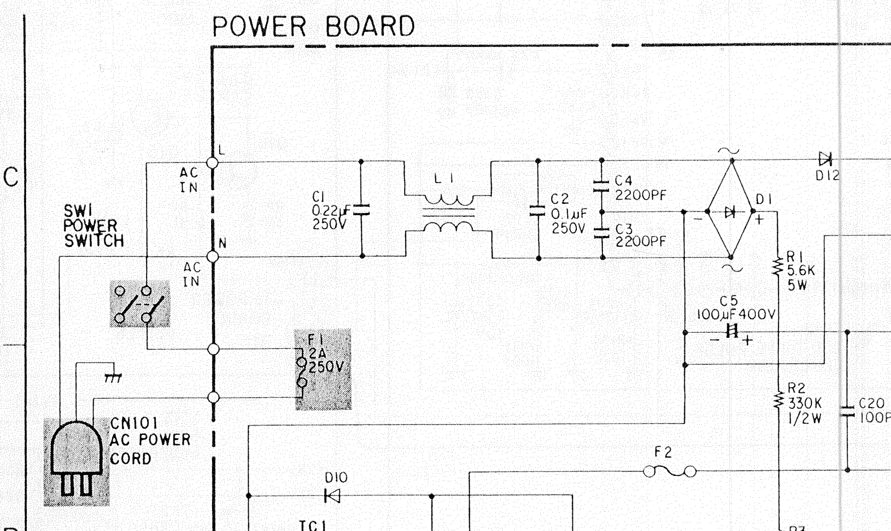
IC1	NJM2903M		B3	Q19	2SB709-Q	(A)	B2	Q38
Q1	2SB709-Q	(A)	B4	Q20	2SB709-Q	(A)	B2	Q39
Q2	2SD601-QR	(Y)	B4	Q21	2SB709-Q	(A)	B2	Q40
Q3	2SB709-Q	(A)	B1	Q22	2SB709-Q	(A)	B2	Q41
Q4	2SD601-QR	(Y)	B1	Q23	2SB709-Q	(A)	B2	Q42
Q5	2SB709-Q	(A)	B1	Q24	2SB709-Q	(A)	B2	Q43
Q6	2SB709-Q	(A)	B2	Q25	2SB709-Q	(A)	B2	Q45
Q7	2SB709-Q	(A)	B2	Q26	2SB709-Q	(A)	B5	D1-328
Q8	2SB709-Q	(A)	B2	Q27	2SB709-Q	(A)	B5	
Q9	2SB709-Q	(A)	B2	Q28	2SB709-Q	(A)	B5	
Q10	2SB709-Q	(A)	B2	Q29	2SB709-Q	(A)	B5	
Q11	2SB709-Q	(A)	B2	Q30	2SB709-Q	(A)	B5	
Q12	2SB709-Q	(A)	B2	Q31	2SB709-Q	(A)	B5	
Q13	2SB709-Q	(A)	B2	Q32	2SB709-Q	(A)	B5	
Q14	2SB709-Q	(A)	B2	Q33	2SB709-Q	(A)	B5	
Q15	2SB709-Q	(A)	B2	Q34	2SB709-Q	(A)	B5	
Q16	2SB709-Q	(A)	B2	Q35	2SB709-Q	(A)	B5	
Q17	2SB709-Q	(A)	B2	Q36	2SB709-Q	(A)	B5	
Q18	2SB709-Q	(A)	B2	Q37	2SB709-Q	(A)	B5	

Q45	2SB709-Q	(A)	B5
D1-328	YWSE1003ZT		

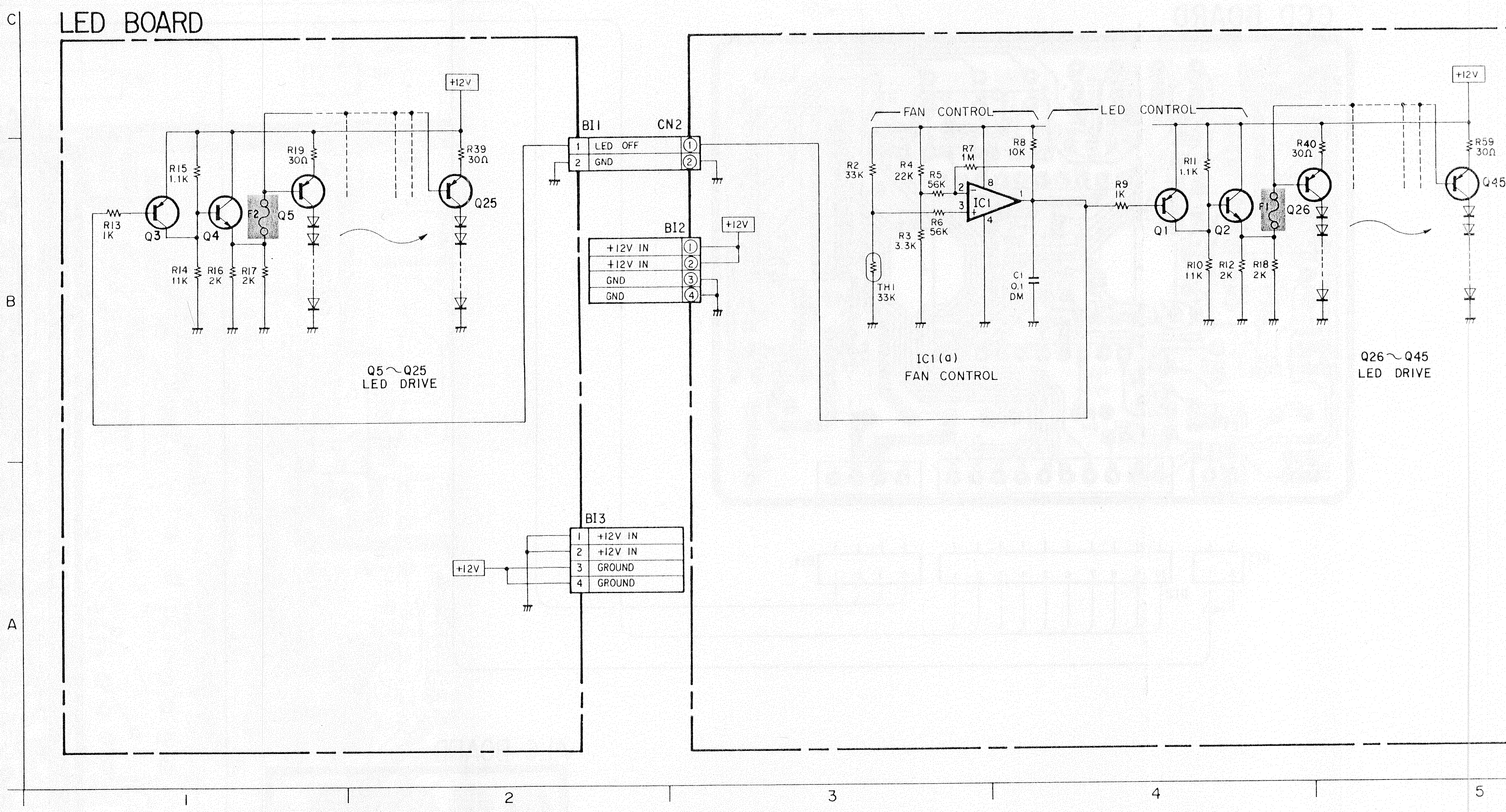
WER BOARD

SC


CN101
AC POWER
CORD
GROUND
SW101
POWER
SWITCH
F1
N
L
C20
C5
J4
R2
R15
D15
C19
C1
R3
J2
D12
L1
R7
D10
C4


POWER BOARD
C
SW1
POWER
SWITCH
AC IN
L
N
AC IN
C1 .022μF 250V
L1
C2 0.1μF 250V
C4 2200PF
C3 2200PF
D1
D12
R1 5.6K 5W
C5 100μF 400V
F1 2A 250V
CN101
AC POWER
CORD
R2 330K 1/2W
C20 100P
F2
D10
IC1

SCHEMATIC DIAGRAM OF LED BOARD


LED BOARD
C
B
A
+12V
R15 1.1K
R13 1K
Q3
Q4
R14 11K
R16 2K
R17 2K
F2
Q5
R19 30Ω
R39 30Ω
Q25
Q5 ~ Q25 LED DRIVE
B11
CN2
1 LED OFF
2 GND
B12
+12V IN
+12V IN
GND
GND
B13
1 +12V IN
2 +12V IN
3 GROUND
4 GROUND
FAN CONTROL
LED CONTROL
R2 33K
R4 22K
R5 56K
R6 56K
R3 3.3K
R7 1M
R8 10K
IC1
TH1 33K
C1 0.1 DM
IC1(a) FAN CONTROL
R9 1K
R11 1.1K
Q1
Q2
R10 11K
R12 2K
R18 2K
F1
Q26
R40 30Ω
R59 30Ω
Q45
Q26 ~ Q45 LED DRIVE
1
2
3
4
5

LED BOARD

IC1	NJM2903M		B3
Q1	2SB709-Q	(A)	B4
Q2	2SD601-QR	(Y)	B4
Q3	2SB709-Q	(A)	B1
Q4	2SD601-QR	(Y)	B1
Q5	2SB709-Q	(A)	B1
Q6	2SB709-Q	(A)	B2
Q7	2SB709-Q	(A)	B2
Q8	2SB709-Q	(A)	B2
Q9	2SB709-Q	(A)	B2
Q10	2SB709-Q	(A)	B2
Q11	2SB709-Q	(A)	B2
Q12	2SB709-Q	(A)	B2
Q13	2SB709-Q	(A)	B2
Q14	2SB709-Q	(A)	B2
Q15	2SB709-Q	(A)	B2
Q16	2SB709-Q	(A)	B2
Q17	2SB709-Q	(A)	B2
Q18	2SB709-Q	(A)	B2
Q19	2SB709-Q	(A)	B2
Q20	2SB709-Q	(A)	B2
Q21	2SB709-Q	(A)	B2
Q22	2SB709-Q	(A)	B2
Q23	2SB709-Q	(A)	B2
Q24	2SB709-Q	(A)	B2
Q25	2SB709-Q	(A)	B2
Q26	2SB709-Q	(A)	B5
Q27	2SB709-Q	(A)	B5
Q28	2SB709-Q	(A)	B5
Q29	2SB709-Q	(A)	B5
Q30	2SB709-Q	(A)	B5
Q31	2SB709-Q	(A)	B5
Q32	2SB709-Q	(A)	B5
Q33	2SB709-Q	(A)	B5
Q34	2SB709-Q	(A)	B5
Q35	2SB709-Q	(A)	B5
Q36	2SB709-Q	(A)	B5
Q37	2SB709-Q	(A)	B5
Q38	2SB709-Q	(A)	B5
Q39	2SB709-Q	(A)	B5
Q40	2SB709-Q	(A)	B5
Q41	2SB709-Q	(A)	B5
Q42	2SB709-Q	(A)	B5
Q43	2SB709-Q	(A)	B5
Q45	2SB709-Q	(A)	B5
D1-328	YWSE1003ZT		

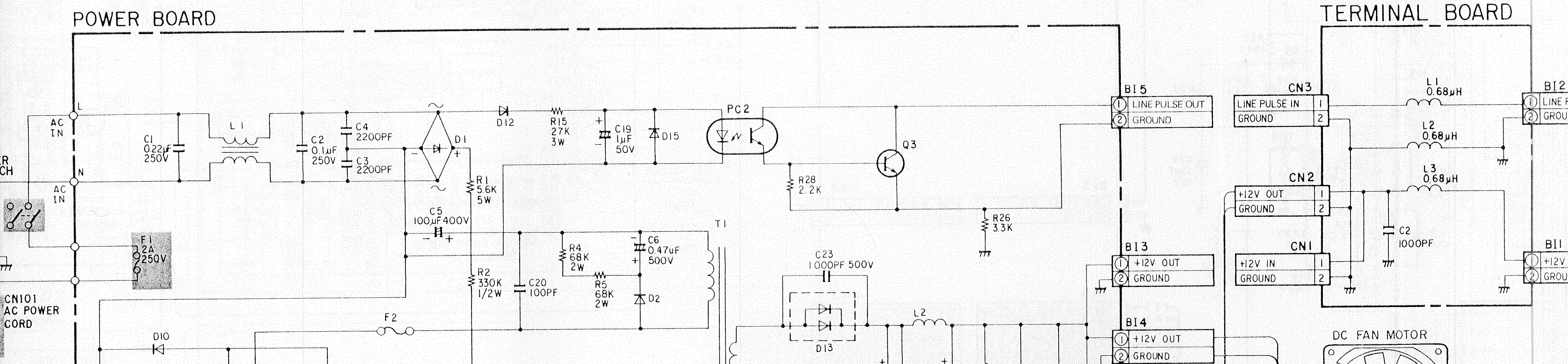
	IC1
Pin 1	11.7
2	1.8
3	4.0
4	0
5	0
6	0
7	0
8	11.8

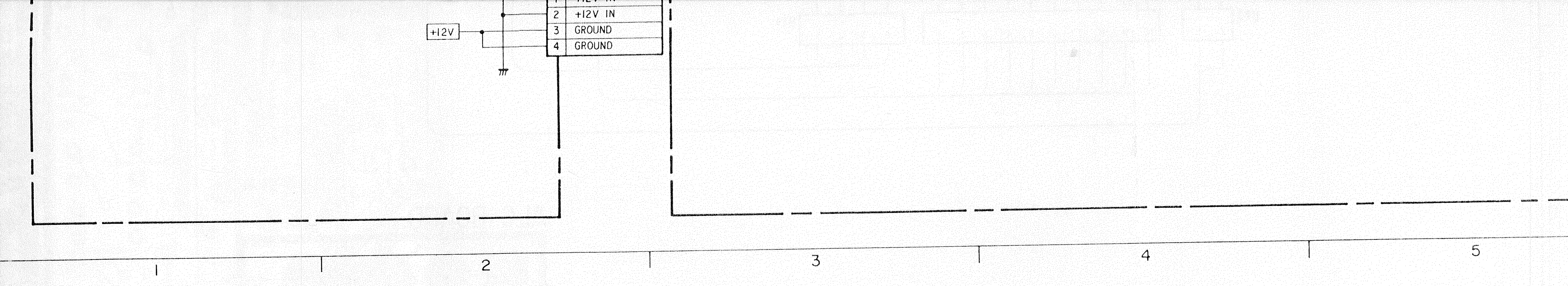
	B	C	E
Q1	11.7	10.7	11.8
Q2	10.7	11.8	10.1
Q3	11.7	10.7	11.8
Q4	10.7	11.8	10.1
Q5	10.1	9.5	10.8

PRODUCUT SAFETY NOTE

The shaded area on this schematic diagram incorporates special features important for protection from X-Radiation, fire and electrical shock hazards. When servicing it is essential that only manufacturer's specified parts be used for the critical components in the shaded areas of the schematic.

SCHEMATIC DIAGRAM OF POWER BOARD


POWER BOARD
TERMINAL BOARD
AC IN
L
N
AC IN
C1 0.22μF 250V
L1
C2 0.1μF 250V
C4 2200PF
C3 2200PF
D1
D12
R15 27K 3W
C19 1μF 50V
D15
PC2
Q3
R28 2.2K
R26 3.3K
R1 5.6K 5W
C5 100μF 400V
F1 2A 250V
R2 330K 1/2W
C20 100PF
R4 68K 2W
R5 68K 2W
C6 0.47uF 500V
D2
T1
C23 1000PF 500V
D13
L2
F2
D10
CN101 AC POWER CORD
B15
LINE PULSE OUT
GROUND
B13
+12V OUT
GROUND
B14
+12V OUT
GROUND
CN3
LINE PULSE IN
GROUND
CN2
+12V OUT
GROUND
CN1
+12V IN
GROUND
L1 0.68μH
L2 0.68μH
L3 0.68μH
C2 1000PF
B12
B11
DC FAN MOTOR


+12V
2 +12V IN
3 GROUND
4 GROUND
1
2
3
4
5

BOARD

NJM2903M		B3
2SB709-Q	(A)	B4
2SD601-QR	(Y)	B4
2SB709-Q	(A)	B1
2SD601-QR	(Y)	B1
2SB709-Q	(A)	B1
2SB709-Q	(A)	B2
2SB709-Q	(A)	B2
2SB709-Q	(A)	B2
2SB709-Q	(A)	B2
2SB709-Q	(A)	B2
2SB709-Q	(A)	B2
2SB709-Q	(A)	B2
2SB709-Q	(A)	B2
2SB709-Q	(A)	B2
2SB709-Q	(A)	B2
2SB709-Q	(A)	B2
2SB709-Q	(A)	B2
2SB709-Q	(A)	B2

Q19	2SB709-Q	(A)	B2
Q20	2SB709-Q	(A)	B2
Q21	2SB709-Q	(A)	B2
Q22	2SB709-Q	(A)	B2
Q23	2SB709-Q	(A)	B2
Q24	2SB709-Q	(A)	B2
Q25	2SB709-Q	(A)	B2
Q26	2SB709-Q	(A)	B5
Q27	2SB709-Q	(A)	B5
Q28	2SB709-Q	(A)	B5
Q29	2SB709-Q	(A)	B5
Q30	2SB709-Q	(A)	B5
Q31	2SB709-Q	(A)	B5
Q32	2SB709-Q	(A)	B5
Q33	2SB709-Q	(A)	B5
Q34	2SB709-Q	(A)	B5
Q35	2SB709-Q	(A)	B5
Q36	2SB709-Q	(A)	B5
Q37	2SB709-Q	(A)	B5

Q38	2SB709-Q	(A)	B5
Q39	2SB709-Q	(A)	B5
Q40	2SB709-Q	(A)	B5
Q41	2SB709-Q	(A)	B5
Q42	2SB709-Q	(A)	B5
Q43	2SB709-Q	(A)	B5
Q45	2SB709-Q	(A)	B5
D1-328	YWSE1003ZT		

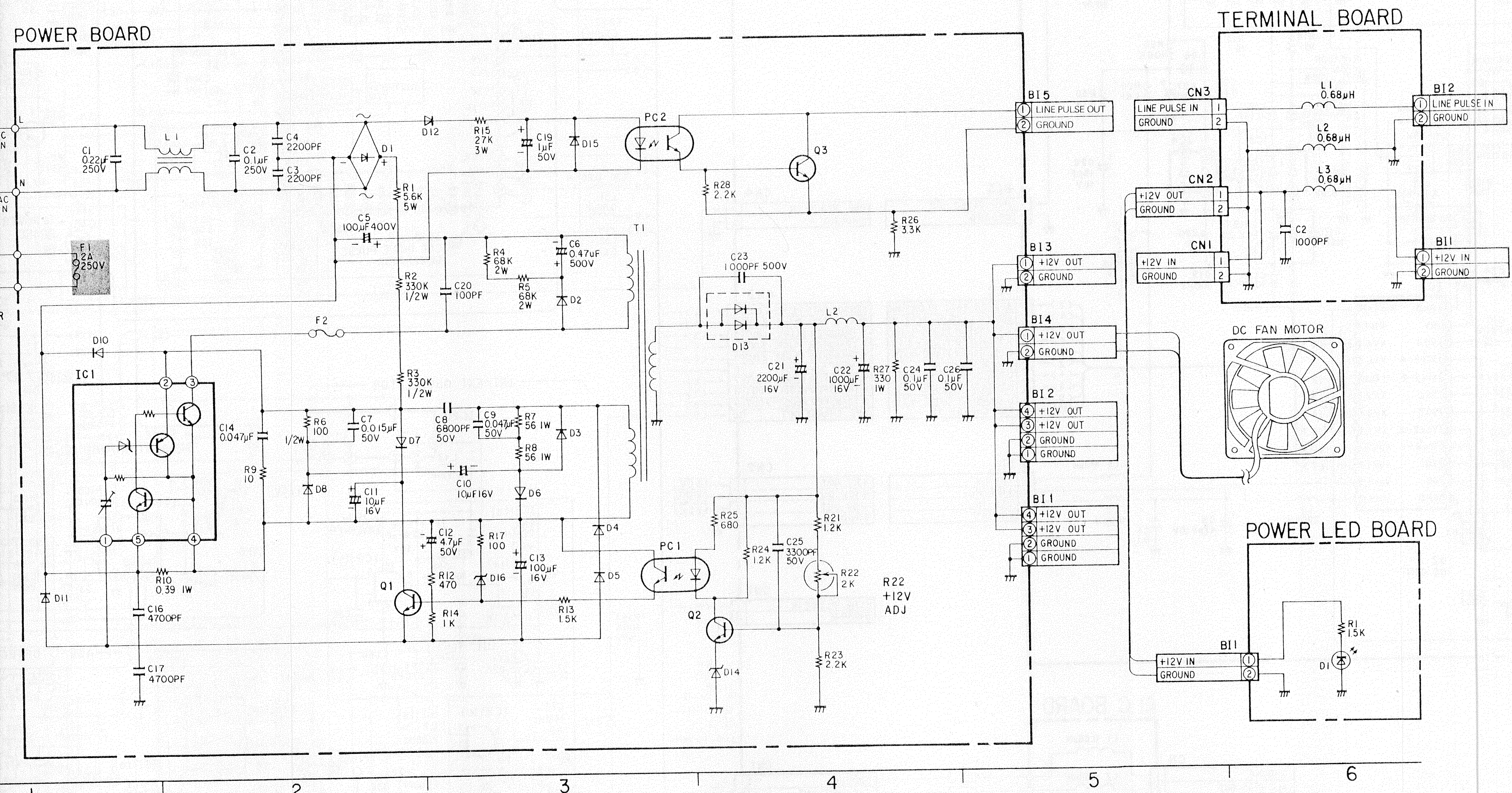
	IC1
Pin 1	11.7
2	1.8
3	4.0
4	0
5	0
6	0
7	0
8	11.8

	B	C	E
Q1	11.7	10.7	11.8
Q2	10.7	11.8	10.1
Q3	11.7	10.7	11.8
Q4	10.7	11.8	10.1
Q5	10.1	9.5	10.8

PRODUCUT SAFETY NOTE

The shaded area on this schematic diagram incorporates special features important for protection from X-Radiation, fire and electrical shock hazards. When servicing it is essential that only manufacturer's specified parts be used for tha critical components in the shaded areas of the schematic.

SCHEMATIC DIAGRAM OF POWER BOARD


POWER BOARD
TERMINAL BOARD
DC FAN MOTOR
POWER LED BOARD
L
N
AC
F1 2A 250V
C1 0.22μF 250V
L1
C2 0.1μF 250V
C4 2200PF
C3 2200PF
D1
D12
R15 27K 3W
C19 1μF 50V
D15
PC2
Q3
R28 2.2K
R26 3.3K
R1 5.6K 5W
C5 100μF 400V
R4 68K 2W
R5 68K 2W
C6 0.47μF 500V
D2
T1
R2 330K 1/2W
C20 100PF
F2
D10
IC1
C14 0.047μF
R9 10
R3 330K 1/2W
R6 100 1/2W
C7 0.015μF 50V
D7
C8 6800PF 50V
C9 0.047μF 50V
R7 56 1W
R8 56 1W
D3
D8
C11 10μF 16V
C10 10μF 16V
D6
D4
D5
R10 0.39 1W
D11
C16 4700PF
C17 4700PF
Q1
C12 4.7μF 50V
R12 470
R14 1K
R17 100
D16
C13 100μF 16V
R13 1.5K
PC1
Q2
D14
R25 680
R24 1.2K
C25 3300PF 50V
R21 1.2K
R22 2K
R22 +12V ADJ
R23 2.2K
C23 1000PF 500V
D13
L2
C21 2200μF 16V
C22 1000μF 16V
R27 330 1W
C24 0.1μF 50V
C26 0.1μF 50V
B15
LINE PULSE OUT
GROUND
B13
+12V OUT
GROUND
B14
+12V OUT
GROUND
B12
+12V OUT
+12V OUT
GROUND
GROUND
B11
+12V OUT
+12V OUT
GROUND
GROUND
CN3
LINE PULSE IN
GROUND
CN2
+12V OUT
GROUND
CN1
+12V IN
GROUND
L1 0.68μH
L2 0.68μH
L3 0.68μH
C2 1000PF
B12
LINE PULSE IN
GROUND
B11
+12V IN
GROUND
B11
+12V IN
GROUND
R1 1.5K
D1
1
2
3
4
5
6

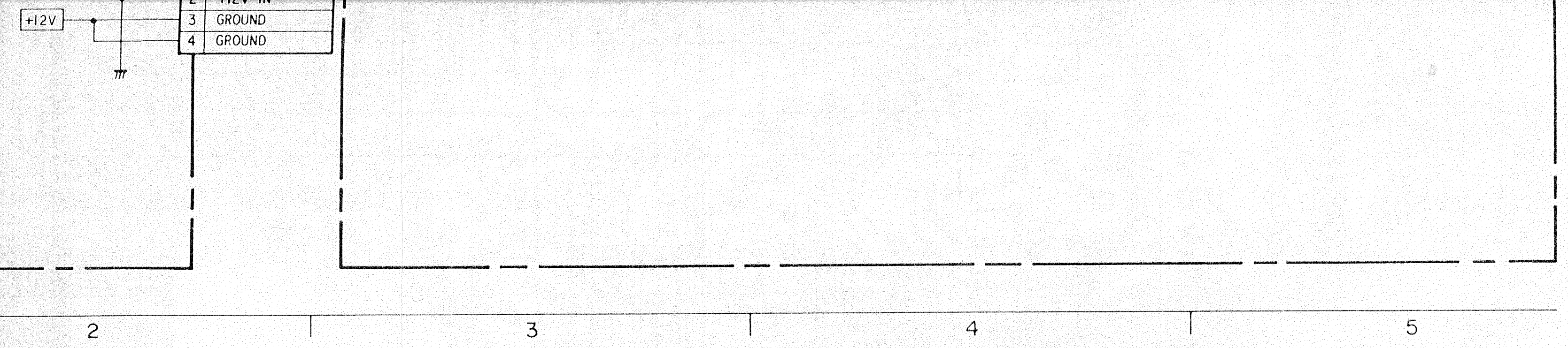
A6

POWER BOARD

IC1	YWSTR11006-S	B1	D3	1SS55	B3	D10	YWSV03YS	B1	D16	YWRD5.6EB1	A3
Q1	1SC2001-K	A2	D4	1SS133	A3	D11	YW10E1N	A1			
Q2	1SC2001-K	A4	D5	1SS133	A3	D12	TW10E-6	C3			
Q3	2SC828A-ST	C4	D6	1SS55	B3	D13	YWD4SC6M	B4			
D1	YWD2SB60	C2	D7	YWERA81-004	B2	D14	RD6.2EB1	A4			
D2	RU1P	B3	D8	1SS55	B2	D15	1SS55	C3			

PRODUCUT SAFETY NOTE

The shaded area on this schematic diagram incorporates special features important for protection from X-Radiation, fire and electrical shock hazards. When servicing it is essential that only manufacturer's specified parts be used for the critical components in the shaded areas of the schematic.


+12V
3 GROUND
4 GROUND
2
3
4
5

Q38	2SB709-Q	(A)	B5
Q39	2SB709-Q	(A)	B5
Q40	2SB709-Q	(A)	B5
Q41	2SB709-Q	(A)	B5
Q42	2SB709-Q	(A)	B5
Q43	2SB709-Q	(A)	B5
Q45	2SB709-Q	(A)	B5
D1-328	YWSE1003ZT		

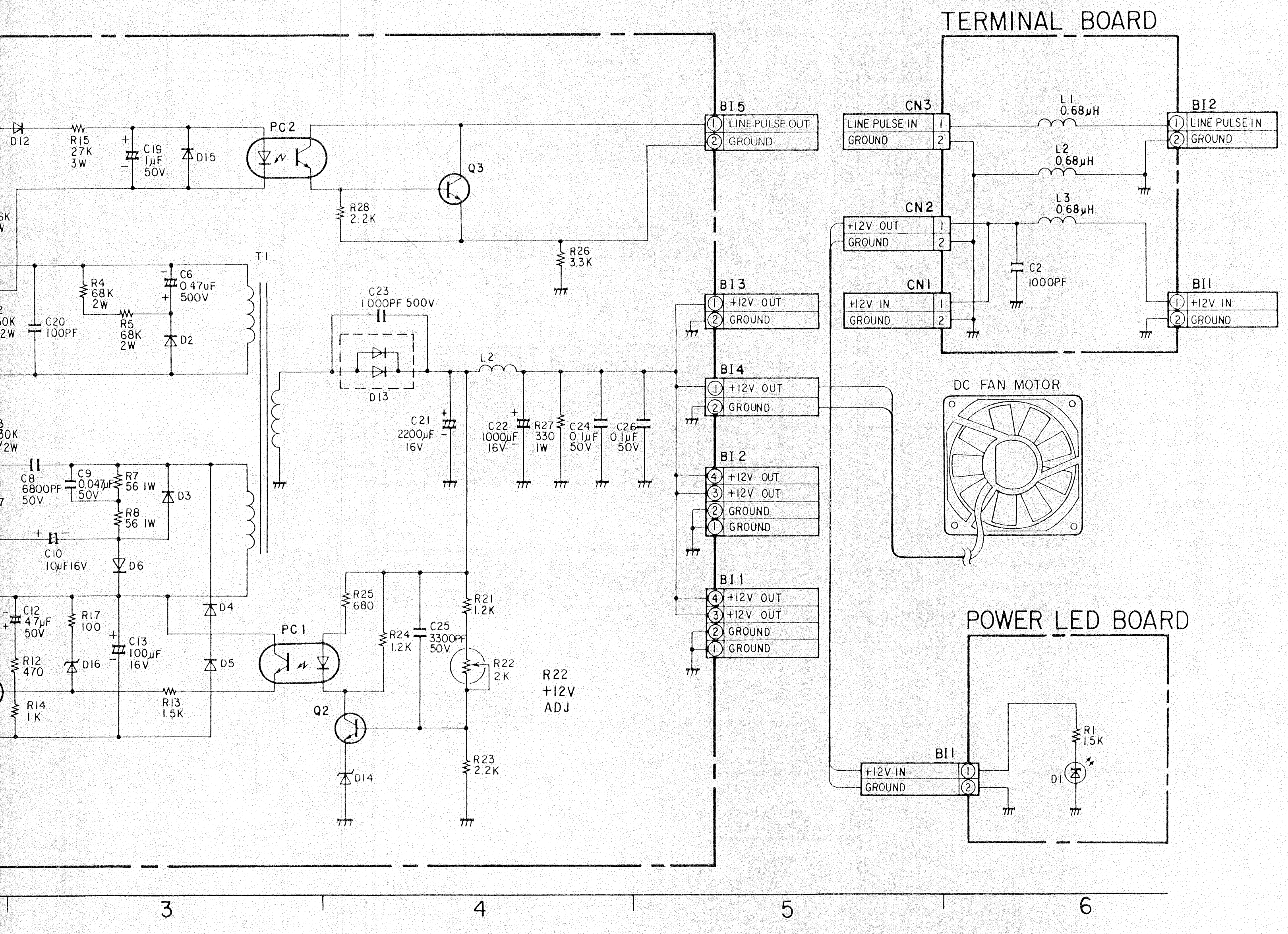
	IC1
Pin 1	11.7
2	1.8
3	4.0
4	0
5	0
6	0
7	0
8	11.8

	B	C	E
Q1	11.7	10.7	11.8
Q2	10.7	11.8	10.1
Q3	11.7	10.7	11.8
Q4	10.7	11.8	10.1
Q5	10.1	9.5	10.8

PRODUCUT SAFETY NOTE

The shaded area on this schematic diagram incorporates special features important for protection from X-Radiation, fire and electrical shock hazards. When servicing it is essential that only manufacturer's specified parts be used for tha critical components in the shaded areas of the schematic.

SCHEMATIC DIAGRAM OF POWER BOARD

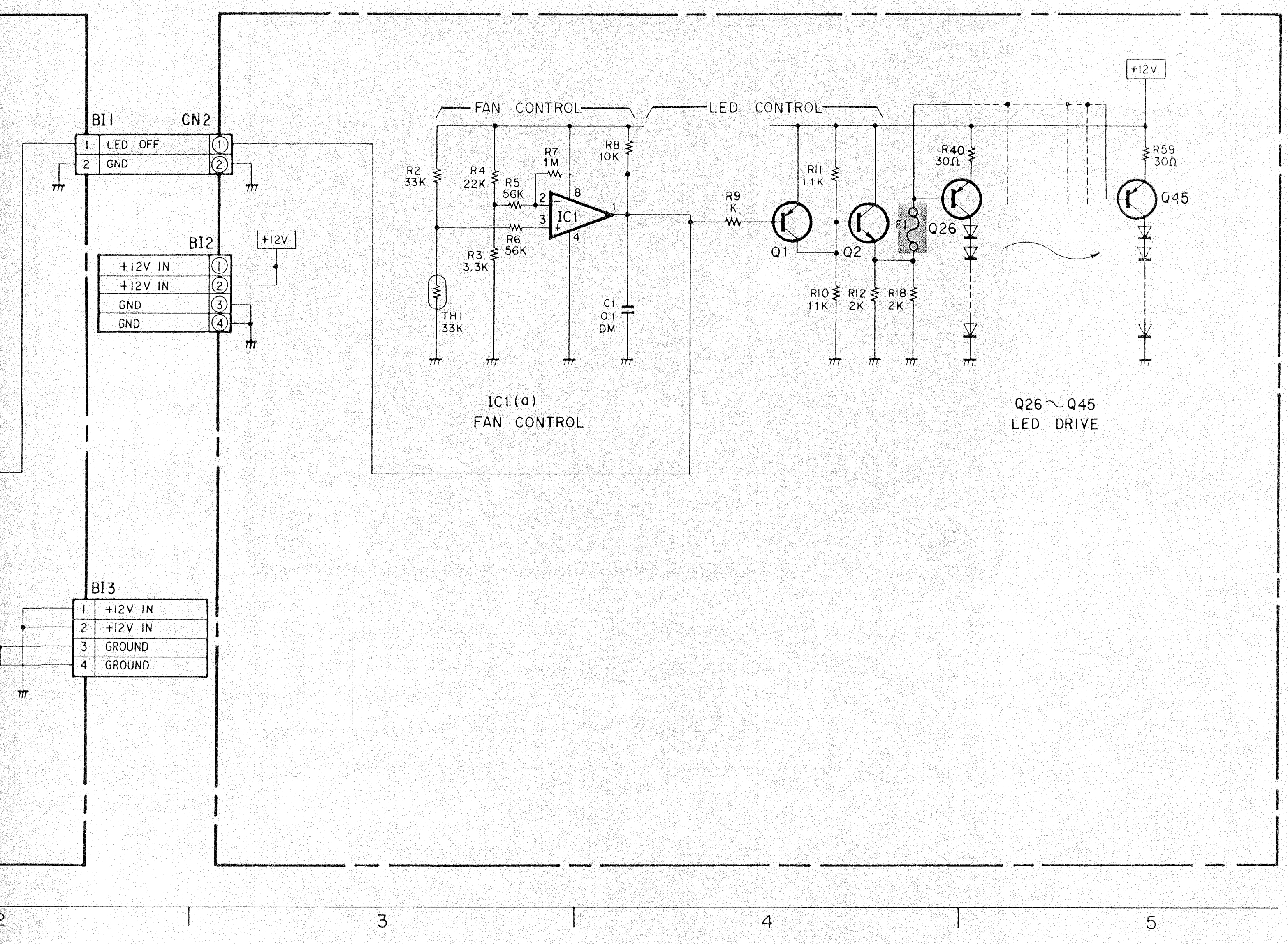

D12
R15 27K 3W
C19 1μF 50V
D15
PC2
Q3
R28 2.2K
R26 3.3K
T1
R4 68K 2W
C6 0.47uF 500V
R5 68K 2W
D2
C20 100PF
C23 1000PF 500V
D13
L2
C21 2200μF 16V
C22 1000μF 16V
R27 330 1W
C24 0.1μF 50V
C26 0.1μF 50V
C8 6800PF 50V
C9 0.047μF 50V
R7 56 1W
R8 56 1W
D3
C10 10μF16V
D6
D4
D5
C12 4.7μF 50V
R17 100
R12 470
D16
C13 100μF 16V
R14 1K
R13 1.5K
PC1
Q2
D14
R25 680
R24 1.2K
C25 3300PF 50V
R21 1.2K
R22 2K
R23 2.2K
R22 +12V ADJ
BI5
① LINE PULSE OUT
② GROUND
BI3
① +12V OUT
② GROUND
BI4
① +12V OUT
② GROUND
BI2
④ +12V OUT
③ +12V OUT
② GROUND
① GROUND
BI1
④ +12V OUT
③ +12V OUT
② GROUND
① GROUND
TERMINAL BOARD
CN3
LINE PULSE IN 1
GROUND 2
L1 0.68μH
L2 0.68μH
L3 0.68μH
BI2
① LINE PULSE IN
② GROUND
CN2
+12V OUT 1
GROUND 2
C2 1000PF
CN1
+12V IN 1
GROUND 2
BI1
① +12V IN
② GROUND
DC FAN MOTOR
POWER LED BOARD
R1 1.5K
D1
BI1
+12V IN ①
GROUND ②
3
4
5
6

	B3	D10	YWSV03YS	B1	D16	YWRD5.6EB1	A3
	A3	D11	YW10E1N	A1			
	A3	D12	TW10E-6	C3			
	B3	D13	YWD4SC6M	B4			
A81-004	B2	D14	RD6.2EB1	A4			
	B2	D15	1SS55	C3			

PRODUCUT SAFETY NOTE

The shaded area on this schematic diagram incorporates special features important for protection from X-Radiation, fire and electrical shock hazards. When servicing it is essential that only manufacturer's specified parts be used for tha critical components in the shaded areas of the schematic.

SCHEMATIC DIAGRAM OF LED BOARD


BI1
CN2
1 LED OFF
2 GND
BI2
+12V IN
+12V IN
GND
GND
+12V
BI3
1 +12V IN
2 +12V IN
3 GROUND
4 GROUND
FAN CONTROL
LED CONTROL
R2 33K
R4 22K
R5 56K
R7 1M
R8 10K
R3 3.3K
R6 56K
IC1
TH1 33K
C1 0.1 DM
R9 1K
R11 1.1K
Q1
Q2
F1
Q26
R40 30Ω
R59 30Ω
Q45
R10 11K
R12 2K
R18 2K
IC1(a)
FAN CONTROL
Q26～Q45
LED DRIVE
2
3
4
5

2SB709-Q	(A)	B5
2SB709-Q	(A)	B5
2SB709-Q	(A)	B5
2SB709-Q	(A)	B5
2SB709-Q	(A)	B5
2SB709-Q	(A)	B5
2SB709-Q	(A)	B5
YWSE1003ZT		

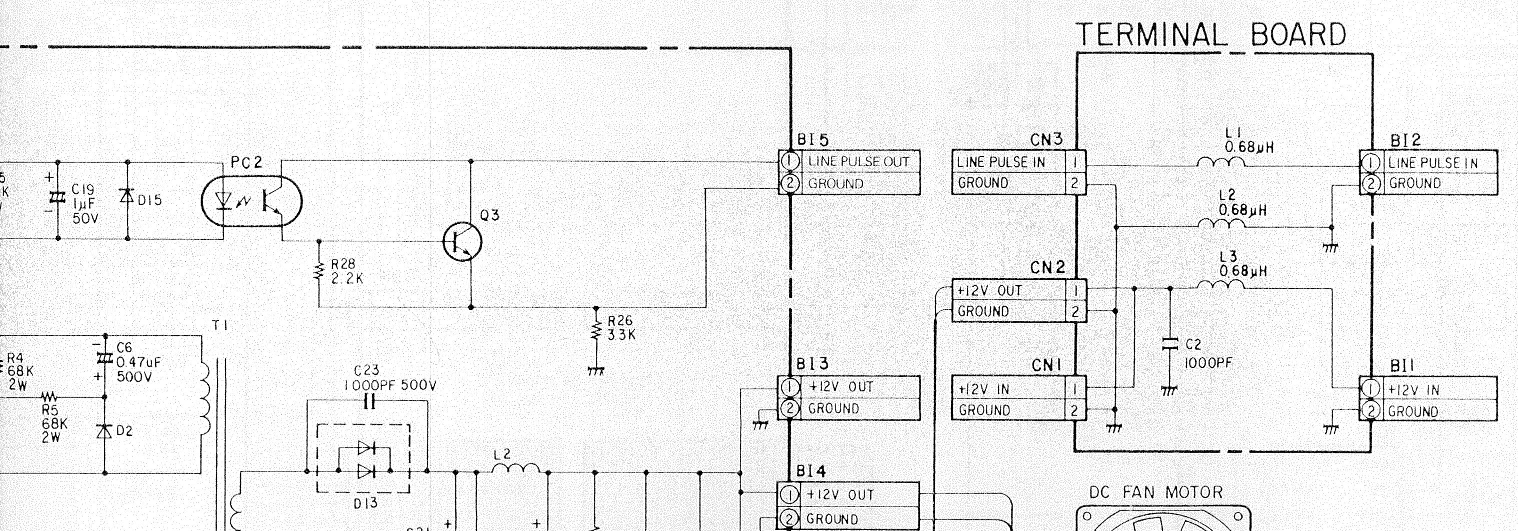
	IC1
Pin 1	11.7
2	1.8
3	4.0
4	0
5	0
6	0
7	0
8	11.8

	B	C	E
Q1	11.7	10.7	11.8
Q2	10.7	11.8	10.1
Q3	11.7	10.7	11.8
Q4	10.7	11.8	10.1
Q5	10.1	9.5	10.8

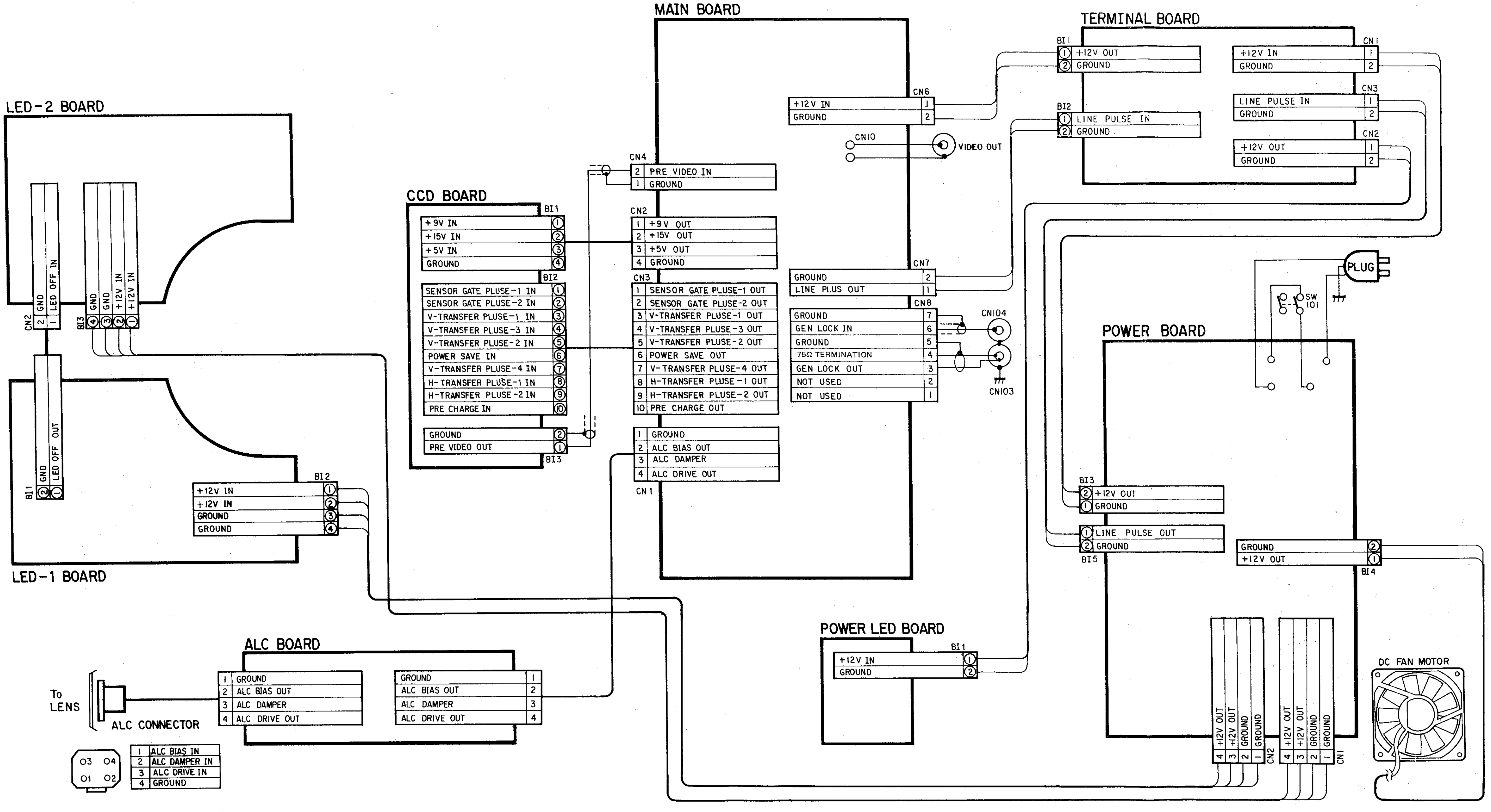
PRODUCUT SAFETY NOTE

The shaded area on this schematic diagram incorporates special features important for protection from X-Radiation, fire and electrical shock hazards. When servicing it is essential that only manufacturer's specified parts be used for tha critical components in the shaded areas of the schematic.

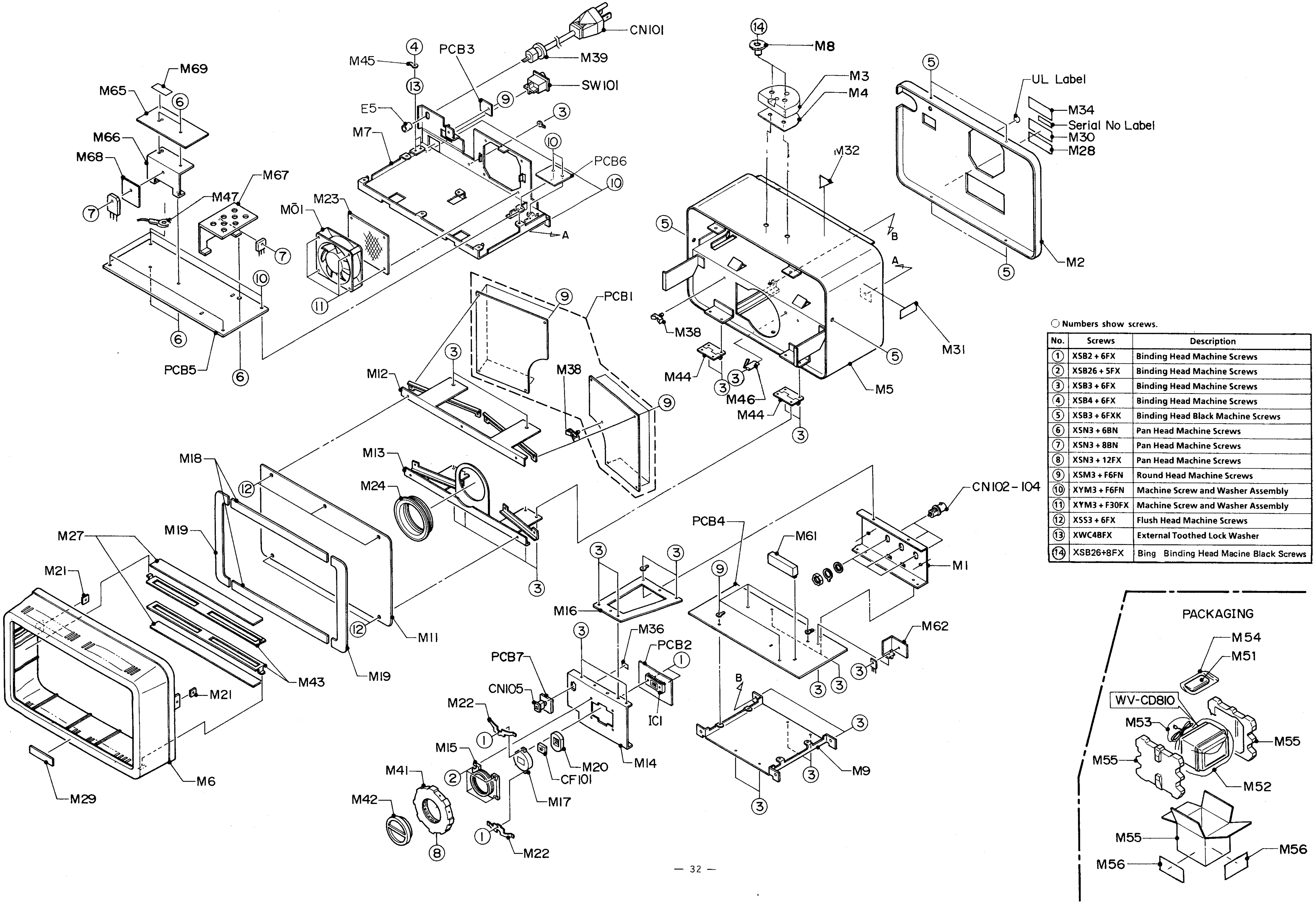
HEMATIC DIAGRAM OF POWER BOARD


TERMINAL BOARD
PC2
C19 1μF 50V
D15
Q3
R28 2.2K
R26 33K
BI5
1 LINE PULSE OUT
2 GROUND
BI3
1 +12V OUT
2 GROUND
BI4
1 +12V OUT
2 GROUND
CN3
LINE PULSE IN 1
GROUND 2
CN2
+12V OUT 1
GROUND 2
CN1
+12V IN 1
GROUND 2
L1 0.68μH
L2 0.68μH
L3 0.68μH
C2 1000PF
BI2
1 LINE PULSE IN
2 GROUND
BI1
1 +12V IN
2 GROUND
T1
R4 68K 2W
R5 68K 2W
C6 0.47uF 500V
D2
C23 1000PF 500V
D13
L2
DC FAN MOTOR

WIRING DIAGRAM OF WV-CD810


MAIN BOARD
TERMINAL BOARD
LED-2 BOARD
LED-1 BOARD
CCD BOARD
ALC BOARD
POWER BOARD
POWER LED BOARD
DC FAN MOTOR
PLUG
SW 101
To LENS
ALC CONNECTOR
VIDEO OUT
CN10
CN104
CN103
CN2 2 GND 1 LED OFF IN
BI3 4 GND 3 GND 2 +12V IN 1 +12V IN
BI1 2 GND 1 LED OFF OUT
BI2 1 +12V IN 2 +12V IN 3 GROUND 4 GROUND
BI1 +9V IN 1, +15V IN 2, +5V IN 3, GROUND 4
BI2 SENSOR GATE PLUSE-1 IN 1, SENSOR GATE PLUSE-2 IN 2, V-TRANSFER PLUSE-1 IN 3, V-TRANSFER PLUSE-3 IN 4, V-TRANSFER PLUSE-2 IN 5, POWER SAVE IN 6, V-TRANSFER PLUSE-4 IN 7, H-TRANSFER PLUSE-1 IN 8, H-TRANSFER PLUSE-2 IN 9, PRE CHARGE IN 10
BI3 GROUND 2, PRE VIDEO OUT 1
CN4 2 PRE VIDEO IN, 1 GROUND
CN2 1 +9V OUT, 2 +15V OUT, 3 +5V OUT, 4 GROUND
CN3 1 SENSOR GATE PLUSE-1 OUT, 2 SENSOR GATE PLUSE-2 OUT, 3 V-TRANSFER PLUSE-1 OUT, 4 V-TRANSFER PLUSE-3 OUT, 5 V-TRANSFER PLUSE-2 OUT, 6 POWER SAVE OUT, 7 V-TRANSFER PLUSE-4 OUT, 8 H-TRANSFER PLUSE-1 OUT, 9 H-TRANSFER PLUSE-2 OUT, 10 PRE CHARGE OUT
CN1 1 GROUND, 2 ALC BIAS OUT, 3 ALC DAMPER, 4 ALC DRIVE OUT
CN6 +12V IN 1, GROUND 2
CN7 GROUND 2, LINE PLUS OUT 1
CN8 GROUND 7, GEN LOCK IN 6, GROUND 5, 75Ω TERMINATION 4, GEN LOCK OUT 3, NOT USED 2, NOT USED 1
BI1 1 +12V OUT, 2 GROUND
BI2 1 LINE PULSE IN, 2 GROUND
CN1 +12V IN 1, GROUND 2
CN3 LINE PULSE IN 1, GROUND 2
CN2 +12V OUT 1, GROUND 2
BI3 2 +12V OUT, 1 GROUND
BI5 1 LINE PULSE OUT, 2 GROUND
BI4 GROUND 2, +12V OUT 1
CN2 4 +12V OUT, 3 +12V OUT, 2 GROUND, 1 GROUND
CN1 4 +12V OUT, 3 +12V OUT, 2 GROUND, 1 GROUND
BI1 +12V IN 1, GROUND 2
1 GROUND, 2 ALC BIAS OUT, 3 ALC DAMPER, 4 ALC DRIVE OUT
GROUND 1, ALC BIAS OUT 2, ALC DAMPER 3, ALC DRIVE OUT 4
O3 O4 O1 O2
1 ALC BIAS IN, 2 ALC DAMPER IN, 3 ALC DRIVE IN, 4 GROUND

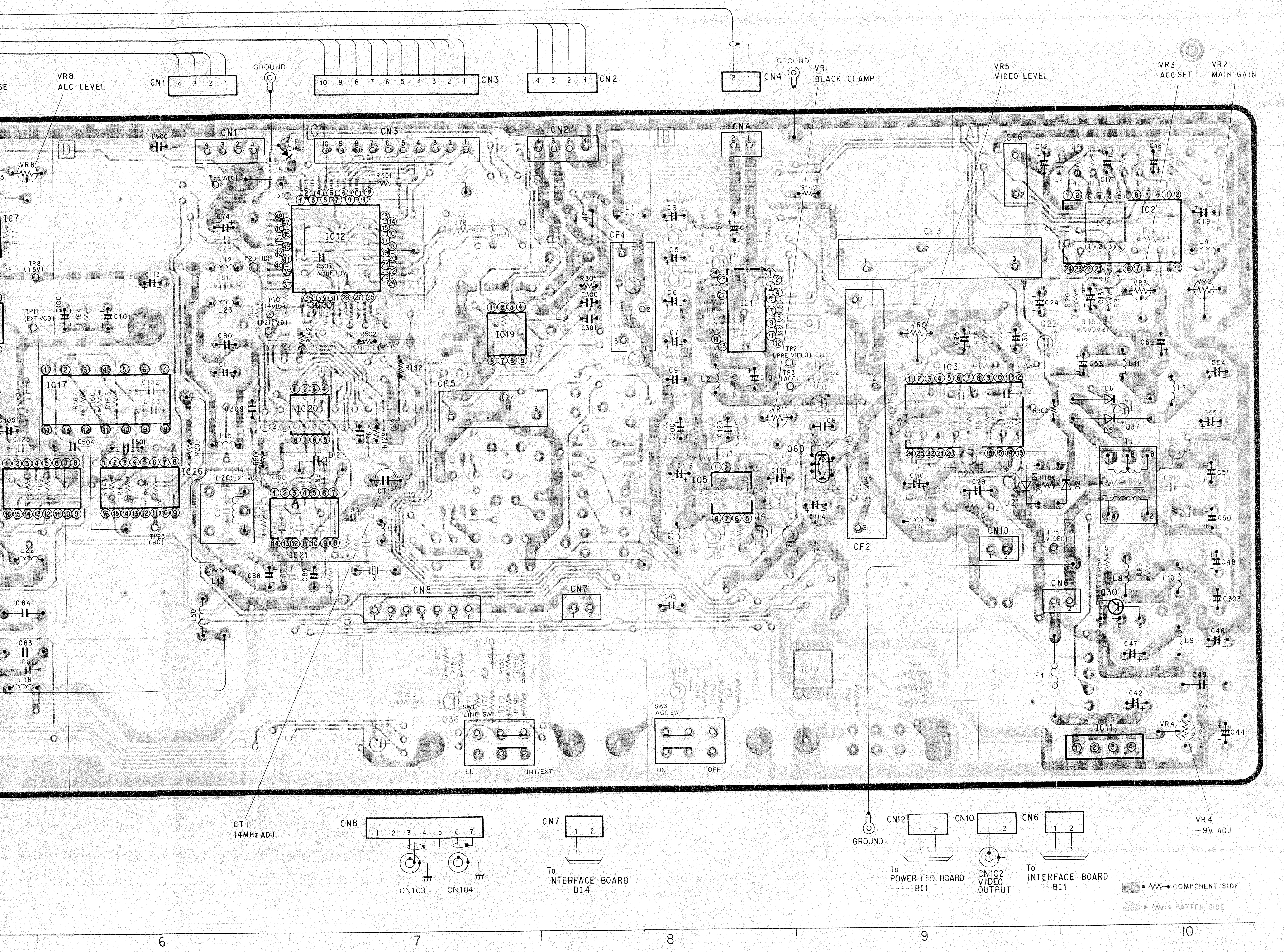
EXPLODED VIEW OF INFRARED CAMERA


CN101
M39
SW101
PCB3
M45
④
⑬
⑨
E5
M7
③
⑩
PCB6
⑩
A
M69
M65
⑥
M66
M68
⑦
M47
M67
⑦
M23
M01
⑪
⑩
⑥
⑥
PCB5
⑭
M8
M3
M4
M32
⑤
UL Label
M34
Serial No Label
M30
M28
⑤
B
A
⑤
M2
M38
M44
③
③
M46
M44
③
⑤
M5
M31
⑨
PCB1
③
M12
M38
⑨
M13
M24
M18
⑫
M19
M27
M21
M11
⑫
M19
M43
M21
M29
M6
③
CN102 - 104
PCB4
③
③
M61
⑨
M1
M16
③
M36
PCB2
①
IC1
M62
③
③
③
PCB7
CN105
M22
①
M15
②
M41
M42
⑧
M17
M20
CF101
M14
①
M22
B
③
③
M9
③
PACKAGING
M54
M51
WV-CD810
M53
M55
M55
M52
M55
M56
M56

○ Numbers show screws.

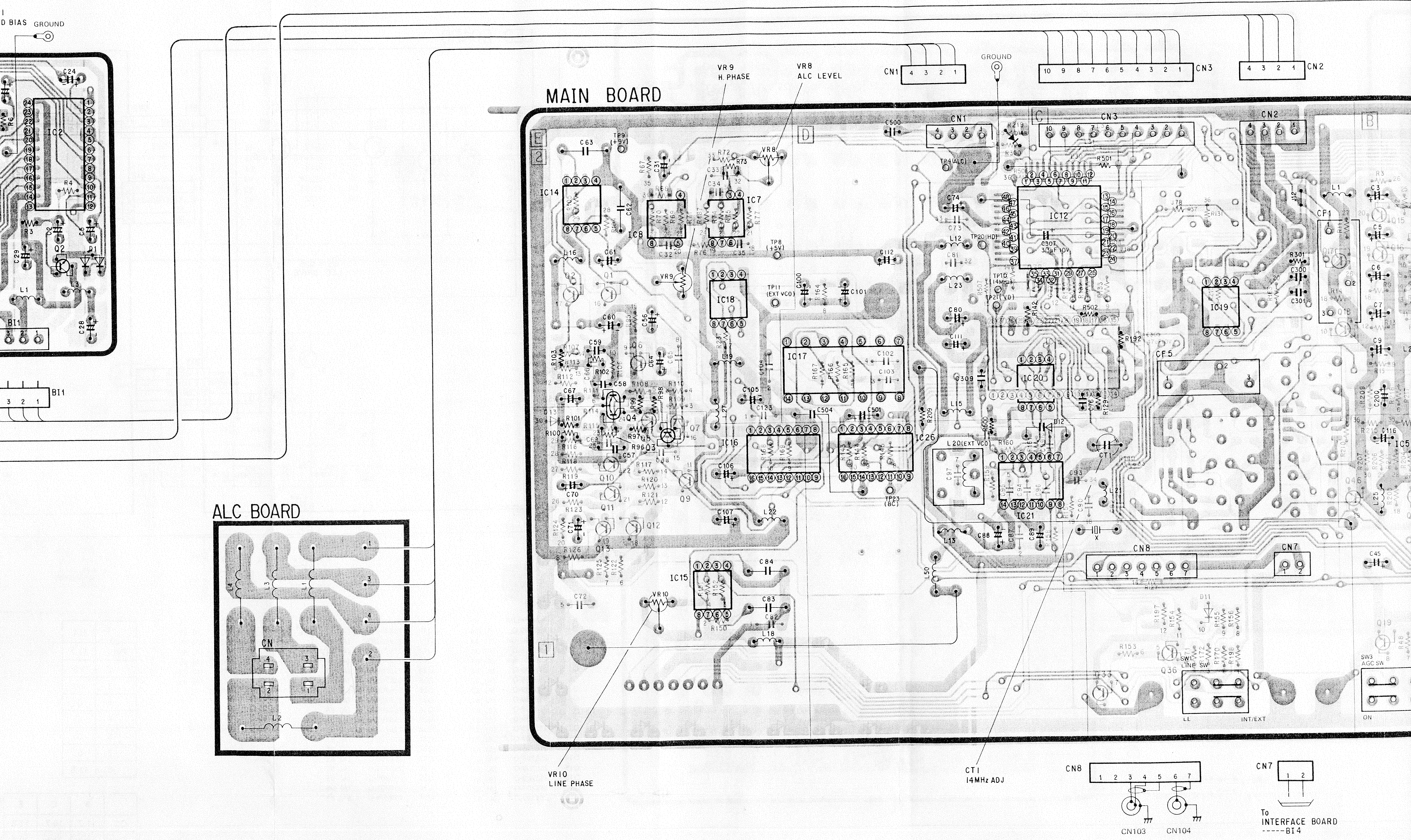
No.	Screws	Description
①	XSB2 + 6FX	Binding Head Machine Screws
②	XSB26 + 5FX	Binding Head Machine Screws
③	XSB3 + 6FX	Binding Head Machine Screws
④	XSB4 + 6FX	Binding Head Machine Screws
⑤	XSB3 + 6FXK	Binding Head Black Machine Screws
⑥	XSN3 + 6BN	Pan Head Machine Screws
⑦	XSN3 + 8BN	Pan Head Machine Screws
⑧	XSN3 + 12FX	Pan Head Machine Screws
⑨	XSM3 + F6FN	Round Head Machine Screws
⑩	XYM3 + F6FN	Machine Screw and Washer Assembly
⑪	XYM3 + F30FX	Machine Screw and Washer Assembly
⑫	XSS3 + 6FX	Flush Head Machine Screws
⑬	XWC4BFX	External Toothed Lock Washer
⑭	XSB26+8FX	Bing Binding Head Macine Black Screws

AIN BOARD


VR8
ALC LEVEL
CN1
GROUND
CN3
CN2
CN4
GROUND
VR11
BLACK CLAMP
VR5
VIDEO LEVEL
VR3
AGC SET
VR2
MAIN GAIN
D
C
B
A
IC7
IC12
IC19
IC20
IC17
IC26
IC21
IC1
IC5
IC3
IC4
IC2
IC10
IC11
CF1
CF2
CF3
CF5
CF6
T1
F1
TP4 (ALC)
TP8 (+5V)
TP11 (EXT VCO)
TP20 (HD)
TP10 (14MHz)
TP21 (VD)
TP2 (PRE VIDEO)
TP3 (AGC)
TP5 (VIDEO)
TP23 (BC)
L20 (EXT VCO)
C307 3.3μF 10V
CT1
CN8
CN7
CN10
CN6
SW1 LINE SW
LL
INT/EXT
SW3 AGC SW
ON
OFF
VR4
CT1
14MHz ADJ
CN103
CN104
To
INTERFACE BOARD
-----BI4
GROUND
CN12
To
POWER LED BOARD
-----BI1
CN102
VIDEO
OUTPUT
To
INTERFACE BOARD
----- BI1
VR4
+9V ADJ
COMPONENT SIDE
PATTEN SIDE
6
7
8
9
10

MAIN BOARD

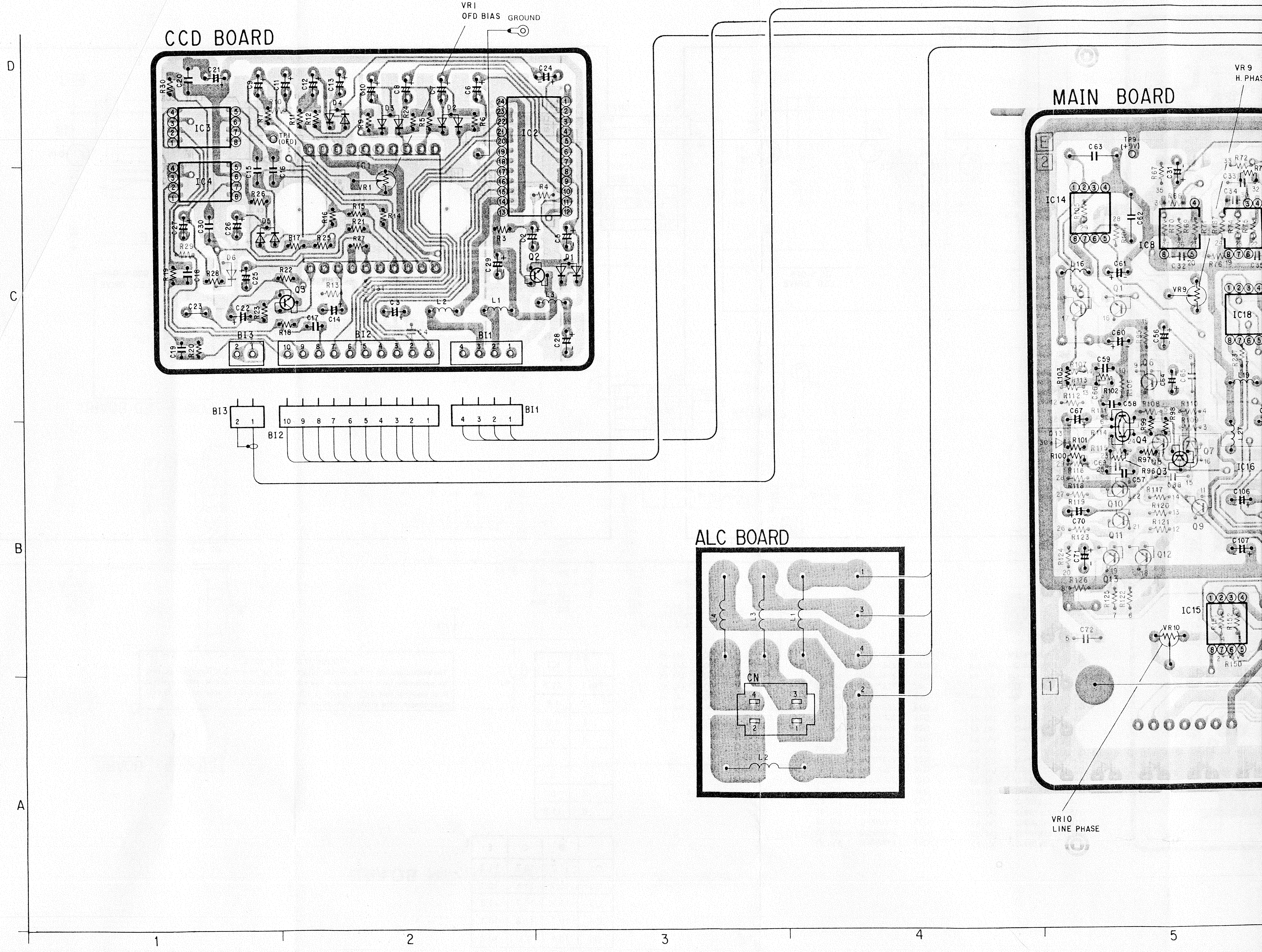
CONDUCTOR VIEW OF MAIN BOARD


D BIAS
GROUND
BI1
MAIN BOARD
ALC BOARD
VR9
H. PHASE
VR8
ALC LEVEL
CN1
CN2
CN3
CN7
CN8
GROUND
TP9 (+9V)
TP8 (+5V)
TP11 (EXT VCO)
TP4 (ALC)
TP20 (HD)
TP10 (14MHz)
TP21 (VD)
TP23 (BC)
IC2
IC7
IC8
IC12
IC14
IC15
IC16
IC17
IC18
IC19
IC20
IC21
IC26
L20 (EXT VCO)
CF1
CF5
CT1
SW1 LINE SW
SW3 AGC SW
LL
INT/EXT
ON
VR10
LINE PHASE
CT1
14MHz ADJ
CN103
CN104
To
INTERFACE BOARD
-----BI4

3
4
5
6
7
8

MAIN BOARD

SCHEMATIC DIAGRAM OF MAIN BOARD


VR1
OFD BIAS
GROUND
CCD BOARD
IC2
IC3
IC4
TP1 (OFD)
VR1
Q2
Q3
L1
L2
L3
D1
D2
D3
D4
D5
D6
BI1
BI2
BI3
MAIN BOARD
VR9
H. PHAS
TP9 (+9V)
IC14
IC8
IC18
IC16
IC15
Q1
Q2
Q3
Q4
Q7
Q9
Q10
Q11
Q12
Q13
L16
L19
L27
VR10
ALC BOARD
L1
L2
L3
L4
CN
1
2
3
4
VR10
LINE PHASE
D
C
B
A
1
2
3
4
5

CCD BOARD

MAIN BOARD

REPLACEMENT PARTS LIST

Important Notice

1. Components identified by " ⚠ " mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
2. Components identified by "o" mark are new parts used from this model.
3. Complete printed circuit board assembly is not available as replacement part.

INFRARED CAMERA WV-CD810

MISCELLANEOUS

REF.NO.	PART NO.	DESCRIPTION
IC1	YWICX031AL	LSI
CF101	YWBK7R5X13R5	Crystal Filter
SW101 ⚠	YWSDDTA3A1	Power Switch
MO1	YWMD625BLF1	DC Motor
CN102,103	YWDBNCR	BNC Connector
CN105	YFD4151N200	ALC Connector
CN104	YFRBS-11A	G/L OUT Connector
CN101 ⚠	YFHBS308B	Ac Power Cord for WV-CD810/B
⚠	YFCE009908FB	AC Power Cord for WV-CD810/C
⚠	YFVM009908B	Ac Power Cord for WV-CD810/G
⚠	YWKPGTSA25-B	Ac Power Cord for WV-CD810/A
E1-4	YFCD20ACCAP	Insulator
E5	o YW2643625102	Filter
M1	o YWV5WA0856A3	Rear Panel
M2	o YWV5EB0477A3	Rear Cover
M3	YFV2TC0020A3	Mounting Bracket C
M4	YFV2PA0207A4	Insulator Sheet
M5	o YWV5KB0700A1	Case
M6	YWV5BA0040A1	Front Escutcheon
M7	o YWV2KC0378A2	Upper Chassis
M8	YFV2NA0084A4	Spacer
M9	YWV2KA0379A3	Bottom Chassis
M11	o YWV1RA0010A3	Optical Filter
M12	YWV2SA1054A3	Mounting Angle A
M13	YWV2SA1055A3	Mounting Angle B
M14	YWV2SA1056A4	Mounting Angle
M15	YFV2TA0060A4	Mounting Bracket
M16	YWV3BA0052A4	Supporting Angle
M17	YWV6FA0070A4	Bracket
M18	YWV2FA0311A4	Cushion
M19	YWV2FA0312A4	Cushion
M20	YWV2FA0313A4	Cushion
M21	YWV2NA0171A4	Spacer
M22	YFV4JA0088B4	Spring
M23	YWV5SA0148A4	Net
M24	YWV6BA0025A3	Hood
M27	YWV3AA0089A4	Dust Proof Parts
M28	YWV7MA0015A4	Caution Label for WV-CD810/G
M29	YFNA326PB-9	Badge
M30	YFV7MA0081A4	Earth Connector Caution Label for WV-CD810/G
M31	YFV7MA0099A4	UL Caution Label
M32	YFV7MA0103A4	Shock Label
M34 ⚠	o YWV7QA1643A4	Main Label for WV-CD810/B
⚠	o YWV7QA1644A4	Main Label for WV-CD810/C
⚠	o YWV7QA1645A4	Main Label for WV-CD810/G
⚠	o YWV7QA1646A4	Main Label for WV-CD810/A
M36	o YWV7SA0760A4	CCD Voltage Label
M38	UAMS-05SV0	Cord Clamp A
M39	YWSR6W-1	Cord Clamp B
M41	YWV3FA0078A4	FB Control Ring
M42	YWBC-2B	Cap
M43	YWV3CA0133A4	Parts Holder
M44	YWV5QA0041A4	Hinge
M45	YW-BCG-EM01	Earth Lag
M46	YWV4JA0241A4	Spring
M47	YWCS1	Cord Clamp C

LED BOARD

REF.NO.	PART NO.	DESCRIPTION	
PCB1 (NLA)	o YWVKA0EL1P1A	Printed Circuit Board Assy	
IC1	NJM2903M	IC	
Q1	2SB709-Q	Transistor	
Q2	2SD601-RS	Transistor	
Q3	2SB709-Q	Transistor	
Q4	2SD601-RS	Transistor	
Q5-43	2SB709-Q	Transistor	
Q45,46	2SB709-Q	Transistor	
D1-328	YWSE1003ZT	LED	
TH1	ERTG2AIJ333	Thermistor	
R2	YWR1220P333D	Metal	33K ohms
R3	YWR1220P332D	Metal	3.3K ohms
R4	YWR1220P223D	Metal	22K ohms
R5,6	YF2116563JT	Carbon	56K ohms 1/16W
R7	YF2116105GT	Carbon	1M ohms 1/16W
R8	YF2116103JT	Carbon	10K ohms 1/16W
R9	YF2116102GT	Carbon	1K ohms 1/16W
R10	YFR1220P113D	Metal	11K ohms
R11	YWR1220P112D	Metal	1.1K ohms
R12	YF2116202JT	Carbon	2K ohms 1/16W
R13	YF2116102GT	Carbon	1K ohms 1/16W
R14	YFR1220P113D	Metal	11K ohms
R15	YWR1220P112D	Metal	1.1K ohms
R16-18	YF2116202JT	Carbon	2K ohms 1/16W
R19-59	YW2116300JT	Carbon	30 ohms 1/16W
C1	YF426104DMS	Ceramic	0.1 µF 50V
F1,2 ⚠	EYP2BN098	Thermal Fuse	
CN1-JM	EMCS0250Z	2 pin Jack Male	

CCD BOARD

REF.NO.	PART NO.	DESCRIPTION	
PCB2 (NLA)	o YWVKY0810E1A	Printed Circuit Board Assy	
IC2	YWCX20180	IC	
IC3,4	MMH0026M	IC	
Q2	2SC2412K7QRS	Transistor	
Q3	2SD601-RS	Transistor	
D1-3	YWDAP202KT6	Diode	
D4	MA157TW	Diode	
D5	YWDAN202KT6	Diode	
D6	MA151K	Diode	
R3	YF2116222GT	Carbon	2.2K ohms 1/16W
R4	YF2116103JT	Carbon	10K ohms 1/16W
R5,6	YF2116104JT	Carbon	100K ohms 1/16W
R7	ERJ6GEYJ133	Carbon	13K ohms 1/10W
R9	YF2116104JT	Carbon	100K ohms 1/16W
R10	YF2116124GT	Carbon	120K ohms 1/16W
R11	YF2116203JT	Carbon	20K ohms 1/16W
R12	YF2116103JT	Carbon	10K ohms 1/16W
R13	YF2116911JT	Carbon	910 ohms 1/16W
R14,15	YF2116100JT	Carbon	10 ohms 1/16W
R16,17	YF2116104JT	Carbon	100K ohms 1/16W
R18-20	YF2116102GT	Carbon	1K ohms 1/16W
R21	YF2116100JT	Carbon	10 ohms 1/16W
R22	YF2116101JT	Carbon	100 ohms 1/16W
R23	YF2116562JT	Carbon	5.6K ohms 1/16W
R24	YF2116104JT	Carbon	100K ohms 1/16W
R25	YF2116102GT	Carbon	1K ohms 1/16W
R26	YF2116912GT	Carbon	9.1K ohms 1/16W
R27	YF2116153JT	Carbon	15K ohms 1/16W
R28	YF2116104JT	Carbon	100K ohms 1/16W
R29	YF2116182GT	Carbon	1.8K ohms 1/16W
R30	YF2116912GT	Carbon	9.1K ohms 1/16W
R31	YF2116202JT	Carbon	2K ohms 1/16W
VR1	EVM13SW00B14	Variable Resistor	10K ohms
C2	ECSF1EE225	Electrolytic	2.2 µF 25V
C3	ECSF1AE476	Electrolytic	47 µF 10V
C4	YF426104DMS	Ceramic	0.1 µF 50V
C5-8	ECSF1HE105	Tantalum	1 µF 50V
C9	ECSF1EE335	Tantalum	3.3 µF 25V
C10	ECSF1HE105	Tantalum	1 µF 50V
C11-14	ECSF1EE335	Tantalum	3.3 µF 25V
C15,16	YF426104DMS	Ceramic	0.1 µF 50V
C17-19	YF400101CHJT	Ceramic	100 pF
C20	YF426104DMS	Ceramic	0.1 µF 50V
C21	ECSF1EE475	Tantalum	4.7 µF 25V
C22	ECSF1EE106	Tantalum	10 µF 25V
C24	ECSF1HE105	Tantalum	1 µF 50V
C25	ECSF1CE106	Tantalum	10 µF 16V
C26,27	ECSF0JE336	Tantalum	33 µF 6.3V
C28	ECSF1CE156	Tantalum	15 µF 16V
C29	ECSF1EE226	Tantalum	22 µF 25V
C30	YF426104DMS	Ceramic	0.1 µF 50V
L1	ELESQ221KA	Coil	220 µH
L2,3	ELESQ101KA	Coil	100 µH

POWER LED BOARD

REF.NO.	PART NO.	DESCRIPTION	
PCB3	o YWVRY0810P2B	Printed Board	
D1	LN238RPH	Diode	
R1	ERDS2TJ152	Carbon	1.5K ohms 1/4W

MAIN BOARD

REF.NO.	PART NO.	DESCRIPTION
PCB4 (NLA)	YWVKZ0810E1A	Printed Circuit Board Assy
IC1	M51266FP	IC
IC2	AN2110S	IC
IC3	AN2210SA	IC
IC4	MN6287S	IC
IC5	NJM2904M	IC
IC7	NJM3414M	IC
IC8	MN6287S	IC
IC10	NJM4556M	IC
IC11	AN6531	IC
IC12	YWCXD1126Q	IC
IC13	YWCXD1030M	IC
IC14	BA225AF	IC
IC15	BA226AF	IC
IC16	NJU4053BM	IC
IC17	YWMC4044P	IC
IC18	MN6287S	IC
IC19	BA226AF	IC
IC20	MN6287S	IC
IC21	MN74HC00S	IC
IC26	YWUPD4049UBG	IC
Q1,2	2SD601-RS	Transistor
Q3	2SB709-Q	Transistor
Q4	YWFMW1-T99	Transistor
Q6	2SA1022-C	Transistor
Q7	YWFMW1-T99	Transistor
Q8,9	2SD601-RS	Transistor
Q10	2SB814-QRS	Transistor
Q11	2SB709-Q	Transistor
Q12	2SA1022-C	Transistor
Q13,14	2SC2404-CDTW	Transistor
Q15,16	2SD601-RS	Transistor
Q17	2SC2404-CDTW	Transistor
Q18-22	2SD601-RS	Transistor
Q28	2SB710-Q	Transistor
Q29	2SD601-RS	Transistor
Q30	2SD1083	Transistor
Q33,36	2SC2404-CDTW	Transistor
Q37	2SD601-RS	Transistor
Q38	2SB710-Q	Transistor
Q45	2SB709-Q	Transistor
Q46-48	2SC2404-CDTW	Transistor
Q49	2SB709-Q	Transistor
Q50,51	2SC2404-CDTW	Transistor
Q60	YWFMW1-T99	Transistor

REF.NO.	PART NO.	DESCRIPTION	
D1,2	1SS108	Diode	
D4	MA151K	Diode	
D5	ES01F	Diode	
D6	MA171	Diode	
D11	MA151K	Diode	
D12	MA328	Diode	
D13	MA151K	Diode	
D14	MA151K	Diode	
D15	DAP202KT7	Diode	
R1	2116910JT	Carbon	91 ohms 1/16W
R2	YF2116331JT	Carbon	330 ohms 1/16W
R3	YF2116561JT	Carbon	560 ohms 1/16W
R4	YF2116103JT	Carbon	10K ohms 1/16W
R5	YF2116102GT	Carbon	1K ohms 1/16W
R6	YF2116151JT	Carbon	150 ohms 1/16W
R7	YF2116153JT	Carbon	15K ohms 1/16W
R8,9	YF2116331JT	Carbon	330 ohms 1/16W
R10	YF2116181JT	Carbon	180 ohms 1/16W
R11	YF2116102GT	Carbon	1K ohms 1/16W
R13	YF2116123JT	Carbon	12K ohms 1/16W
R14,15	YF2116102GT	Carbon	1K ohms 1/16W
R16,17	YF2116222GT	Carbon	2.2K ohms 1/16W
R18	YF2116123JT	Carbon	12K ohms 1/16W
R19	YF2116105GT	Carbon	1M ohms 1/16W
R20	YF2116473GT	Carbon	47K ohms 1/16W
R21	YF2116563JT	Carbon	56K ohms 1/16W
R22	YF2116102GT	Carbon	1K ohms 1/16W
R23	YF2116333GT	Carbon	33K ohms 1/16W
R24,25	YF2116102GT	Carbon	1K ohms 1/16W
R26	YF2116912GT	Carbon	9.1K ohms 1/16W
R27	YF2116153JT	Carbon	15K ohms 1/16W
R28	YF2116183GT	Carbon	18K ohms 1/16W
R29	YF2116821GT	Carbon	820 ohms 1/16W
R30	YF2116512JT	Carbon	5.1K ohms 1/16W
R31	YF2116473GT	Carbon	47K ohms 1/16W
R32	YF2116681JT	Carbon	680 ohms 1/16W
R33	YF2116221JT	Carbon	220 ohms 1/16W
R34	YF2116751JT	Carbon	750 ohms 1/16W
R35,36	YF2116103JT	Carbon	10K ohms 1/16W
R38	YF2116684JT	Carbon	680K ohms 1/16W
R39	YF2116681JT	Carbon	680 ohms 1/16W
R41	YF2116102GT	Carbon	1K ohms 1/16W
R43	YF2116331JT	Carbon	330 ohms 1/16W
R44,45	YF2116103JT	Carbon	10K ohms 1/16W
R46	YF2116680JT	Carbon	68 ohms 1/16W
R47-49	YF2116103JT	Carbon	10K ohms 1/16W
R50	YF2116332JT	Carbon	3.3K ohms 1/16W
R51	YF2116333GT	Carbon	33K ohms 1/16W
R52	YF2116123JT	Carbon	12K ohms 1/16W
R53	YF2116332JT	Carbon	3.3K ohms 1/16W
R54	YF2116224JT	Carbon	220K ohms 1/16W
R58	YF2116392JT	Carbon	3.9K ohms 1/16W
R59	YF2116512JT	Carbon	5.1K ohms 1/16W
R60	YF2116222GT	Carbon	2.2K ohms 1/16W
R61	YWR1220P333D	Metal	33K ohms
R62	R1220P123D	Metal	12K ohms
R63	YWR1220P183D	Metal	18K ohms
R64	YWR1220P153D	Metal	15K ohms
R66	YF2116122JT	Carbon	1.2K ohms 1/16W
R67	YF2116105GT	Carbon	1M ohms 1/16W
R68	YF2116223JT	Carbon	22K ohms 1/16W
R69	YF2116104JT	Carbon	100K ohms 1/16W
R70,71	YF2116123JT	Carbon	12K ohms 1/16W
R72	YF2116223JT	Carbon	22K ohms 1/16W
R73	YF2116103JT	Carbon	10K ohms 1/16W
R74	YF2116153JT	Carbon	15K ohms 1/16W
R75	YF2116223JT	Carbon	22K ohms 1/16W
R76	YF2116222GT	Carbon	2.2K ohms 1/16W
R77	YF2116102GT	Carbon	1K ohms 1/16W
R95	YF2116104JT	Carbon	100K ohms 1/16W
R96	YF2116333GT	Carbon	33K ohms 1/16W
R97	YF2116222GT	Carbon	2.2K ohms 1/16W
R98	YF2116102GT	Carbon	1K ohms 1/16W
R99	YF2116153JT	Carbon	15K ohms 1/16W
R100	YF2116103JT	Carbon	10K ohms 1/16W
R101	YF2116222GT	Carbon	2.2K ohms 1/16W
R102,103	YF2116223JT	Carbon	22K ohms 1/16W
R104	YF2116472GT	Carbon	4.7K ohms 1/16W
R105	YF2116104JT	Carbon	100K ohms 1/16W
R106	YF2116202JT	Carbon	2K ohms 1/16W
R107	YF2116222GT	Carbon	2.2K ohms 1/16W
R108	YF2116471JT	Carbon	470 ohms 1/16W
R109	YF2116103JT	Carbon	10K ohms 1/16W
R110	YF2116392JT	Carbon	3.9K ohms 1/16W
R111	YF2116471JT	Carbon	470 ohms 1/16W
R112,113	YF2116103JT	Carbon	10K ohms 1/16W
R114	YF2116102GT	Carbon	1K ohms 1/16W
R115	YF2116222GT	Carbon	2.2K ohms 1/16W
R116	YF2116103JT	Carbon	10K ohms 1/16W
R117	YF2116563JT	Carbon	56K ohms 1/16W
R118	YF2116222GT	Carbon	2.2K ohms 1/16W
R119	YF2116684JT	Carbon	680K ohms 1/16W
R120	YF2116222GT	Carbon	2.2K ohms 1/16W
R121	YF2116102GT	Carbon	1K ohms 1/16W
R122	YF2116152JT	Carbon	1.5K ohms 1/16W
R123	YF2116242GT	Carbon	2.4K ohms 1/16W
R124	YF2116102GT	Carbon	1K ohms 1/16W
R125	YF2116273GT	Carbon	27K ohms 1/16W
R126	YF2116103JT	Carbon	10K ohms 1/16W
R127	YF2116750JT	Carbon	75 ohms 1/16W
R129	YF2116105GT	Carbon	1M ohms 1/16W
R130	YF2116222GT	Carbon	2.2K ohms 1/16W
R131-133	YF2116104JT	Carbon	100K ohms 1/16W
R135	YF2116222GT	Carbon	2.2K ohms 1/16W
R142	YF2116105GT	Carbon	1M ohms 1/16W
R143-145	YF2116332JT	Carbon	3.3K ohms 1/16W
R149	YF2116562JT	Carbon	5.6K ohms 1/16W
R150	YF2116472GT	Carbon	4.7K ohms 1/16W
R151	YF2116104JT	Carbon	100K ohms 1/16W
R152	YF2116222GT	Carbon	2.2K ohms 1/16W

REF.NO	PART NO.	DESCRIPTION	
R153	YF2116103JT	Carbon	10K ohms 1/16W
R154	YF2116104JT	Carbon	100K ohms 1/16W
R155	YF2116393GT	Carbon	39K ohms 1/16W
R156	YF2116223JT	Carbon	22K ohms 1/16W
R157	YF2116751JT	Carbon	750 ohms 1/16W
R158	YF2116105GT	Carbon	1M ohms 1/16W
R159	YF2116101JT	Carbon	100 ohms 1/16W
R160	YF2116105GT	Carbon	1M ohms 1/16W
R161	YF2116333GT	Carbon	33K ohms 1/16W
R163	YF2116103JT	Carbon	10K ohms 1/16W
R164	YF2116153JT	Carbon	15K ohms 1/16W
R165	YF2116682JT	Carbon	6.8K ohms 1/16W
R166,167	YF2116561JT	Carbon	560 ohms 1/16W
R168	YF2116104JT	Carbon	100K ohms 1/16W
R169	YF2116103JT	Carbon	10K ohms 1/16W
R170	YF2116222GT	Carbon	2.2K ohms 1/16W
R171	YF2116223JT	Carbon	22K ohms 1/16W
R172	YF2116103JT	Carbon	10K ohms 1/16W
R184	YF2116272JT	Carbon	2.7K ohms 1/16W
R185	YF2116102GT	Carbon	1K ohms 1/16W
R186	YF2116152JT	Carbon	1.5K ohms 1/16W
R187	YF2116154JT	Carbon	150K ohms 1/16W
R192	YF2116104JT	Carbon	100K ohms 1/16W
R197	YF2116103JT	Carbon	10K ohms 1/16W
R198	YF2116102GT	Carbon	1K ohms 1/16W
R199	YF2116473GT	Carbon	47K ohms 1/16W
R200	YF2116163JT	Carbon	16K ohms 1/16W
R201	YF2116102GT	Carbon	1K ohms 1/16W
R202	YF2116562JT	Carbon	5.6K ohms 1/16W
R203	YF2116222GT	Carbon	2.2K ohms 1/16W
R204	YF2116682JT	Carbon	6.8K ohms 1/16W
R205,206	YF2116562JT	Carbon	5.6K ohms 1/16W
R207	YF2116272JT	Carbon	2.7K ohms 1/16W
R208	YF2116102GT	Carbon	1K ohms 1/16W
R209	YF2116562JT	Carbon	5.6K ohms 1/16W
R210	YF2116202JT	Carbon	2K ohms 1/16W
R211	YF2116101JT	Carbon	100 ohms 1/16W
R212	YF2116104JT	Carbon	100K ohms 1/16W
R213	YF2116472GT	Carbon	4.7K ohms 1/16W
R214	YF2116272JT	Carbon	2.7K ohms 1/16W
R215	YF2116392JT	Carbon	3.9K ohms 1/16W
R216	YF2116472GT	Carbon	4.7K ohms 1/16W
R217	YF2116474JT	Carbon	470K ohms 1/16W
R218	YF2116203JT	Carbon	20K ohms 1/16W
R219	YF2116302GT	Carbon	3K ohms 1/16W
R236	YF2116182GT	Carbon	1.8K ohms 1/16W
R237	YF2116102GT	Carbon	1K ohms 1/16W
R300	YF2116123JT	Carbon	12K ohms 1/16W
R301	YF2116153JT	Carbon	15K ohms 1/16W
R302	YF2116473GT	Carbon	47K ohms 1/16W
R303	ERDS2TJ471	Carbon	470 ohms 1/4W
R500	YF2116102GT	Carbon	1K ohms 1/16W
R501	ERDS2FJ101	Carbon	100 ohms 1/4W
R504	YF2116104JT	Carbon	100K ohms 1/16W
R505	YF2116101JT	Carbon	100 ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION	
R507	YF2116102GT	Carbon	1K ohms 1/16W
VR2	EVN3ACA00B24	Variable Resistor	20K ohms
VR3	EVN3ACA00B14	Variable Resistor	10Kohms
VR4	EVN3ACA00B52	Variable Resistor	500 ohms
VR5,8	EVN3ACA00BS2	Variable Resistor	680 ohms
VR9	EVN3ACA00B24	Variable Resistor	20K ohms
VR10	EVN3ACA00B15	Variable Resistor	100Kohms
VR11	EVN3ACA00B23	Variable Resistor	2K ohms
C1	ECEA1CSS221	Electrolytic	220 µF 16V
C3	ECSF1CE226	Tantalum	22 µF 16V
C4	YF400820CHJT	Ceramic	82 PF
C5	ECEA0JU470	Electrolytic	47 µF 6.3V(SU)
C6	ECEA0JU101	Electrolytic	100 µF 6.3V
C7	ECSF0JE106	Electrolytic	10µ F 6.3V
C8	ECEA1HN010S	Electrolytic	1 µF 50V
C9	ECSF1CE226	Tantalum	22 µF 16V
C10	ECSF1AE476	Tantalum	47 µF 10V
C11	YF426104DMS	Ceramic	0.1 µF 50V
C12	ECSF0JE106	Tantalum	10 µF 6.3V
C13	ECEA1EU4R7	Electrolytic	4.7 µF 25V (SU)
C14,15	YF426104DMS	Ceramic	0.1 µF 50V
C16	YF400103XMT	Ceramic	0.01 µF
C17	ECEA1HS010S	Electrolytic	1 µF 50V
C18	ECEA1AU220	Electrolytic	22 µF 10V
C19	ECEA1AU470	Electrolytic	47 µF 10V
C20	YF426104DMS	Ceramic	0.1 µF 50V
C21,22	YF400473FZT	Ceramic	0.047 µF
C23	YF426104DMS	Ceramic	0.1 µF 50V
C24	ECEA1HS010S	Electrolytic	1 µF 50V
C25	ECEA0JU101	Electrolytic	100 µF 6.3V
C26	YF426104DMS	Ceramic	0.1 µF 50V
C27,28	YF400473FZT	Ceramic	0.047 µF
C29	ECEA0JU471	Electrolytic	460 µF 6.3V
C30	ECEA1AU220	Electrolytic	22 µF 10V
C31	ECEA1HKS010	Electrolytic	1 µF 50V
C32	YF400473FZT	Ceramic	0.047 µF
C33	YF426104DMS	Ceramic	0.1 µF 50V
C34	YF400101SLKT	Ceramic	100 pF
C35	YF400473FZT	Ceramic	0.047 µF
C42	ECEA1CKA101	Electrolytic	100 µF 16V
C44	ECEA1AU221	Electrolytic	220 µF 10V
C45,46	ECEA0JU101	Electrolytic	100 µF 6.3V
C47	ECEA0JU470	Electrolytic	47 µF 6.3V(SU)
C48	ECEA0JU220	Electrolytic	22 µF 6.3V
C49	ECQP1302JZ	Plastic	3000pF 100V
C50	ECEA0JU470	Electrolytic	47 µF 6.3V(SU)
C51	ECEA0JS221	Electrolytic	220 µF 6.3V
C52	ECEA1AU101	Electrolytic	100 µF 10V
C53	ECEA0JU101	Electrolytic	100 µF 6.3V
C54	ECEA1VU470	Electrolytic	47 µF 35V
C55	ECEA1EU470	Electrolytic	47 µF 25V
C56	ECEA1HS010S	Electrolytic	1 µF 50V
C57	YF426104DMS	Ceramic	0.1 µF 50V
C58	YF400392XKT	Ceramic	3900 pF

REF.NO.	PART NO.	DESCRIPTION
C59	YF400471CHJT	Ceramic 470 pF
C60	ECEA1AU470	Electrolytic 47 µF 10V
C61	ECSF1AE106	Tantalum 10 µF 10V
C62	ECQP1221JZ	Plastic 220 pF 100V
C63	ECQP1102JZ	Plastic 1000 pF 100V
C64	ECEA1AU101	Electrolytic 100 µF 10V
C65,66	YF426104DMS	Ceramic 0.1 µF 50V
C67	ECEA1AS330	Electrolytic 33 µF 10V
C68	YF426104DMS	Ceramic 0.1 µF 50V
C69	YF400121SLKT	Ceramic 120 pF
C70	ECEA1HUR47	Electrolytic 0.47 µF 50V
C71	ECEA1AU470	Electrolytic 47 µF 10V
C72,73	YF426104DMS	Ceramic 0.1 µF 50V
C74	ECEA0JU101	Electrolytic 100 µF 6.3V
C76	YF400102SLKT	Ceramic 1000pF SL
C77	YF400101CHJT	Ceramic 100 pF
C78	YF426104DMS	Ceramic 0.1 µF 50V
C81,82	YF426104DMS	Ceramic 0.1 µF 50V
C83,84	ECQM1H104JZ	Plastic 0.1 µF 50V
C87	YF426104DMS	Ceramic 0.1 µF 50V
C88	ECEA0JU101	Electrolytic 100 µF 6.3V
C89	ECSF1AE476	Tantalum 47 µF 10V
C90	YF400220CHJT	Ceramic 22 pF
C92	YF400330CHJT	Ceramic 33 pF
C93	YF400271SLKT	Ceramic 270 pF
C94	YF400100CHJT	Ceramic 10 pF
C95	YF400200CHJT	Ceramic 20 pF
C96	YF426104DMS	Ceramic 0.1 µF 50V
C97	YF400220CHJT	Ceramic 22 pF
C98	YF400222XKT	Ceramic 2200 pF
C99	YF400101CHJT	Ceramic 100 pF
C100	ECEA1HU3R3	Electrolytic 3.3 µF 50V
C101	ECEA1CU100	Electrolytic 10 µF 16V
C102	YF426104DMS	Ceramic 0.1 µF 50V
C103	YF400333XKT	Ceramic 0.03 µF
C104	YF426104DMS	Ceramic 0.1 µF 50V
C105	ECEA0JU331	Electrolytic 330 µF 6.3V
C106	ECSF1AE226	Tantalum 22 µF 10V
C107	ECEA1CU101	Electrolytic 100 µF 16V
C110	ECEA0JU470	Electrolytic 47 µF 6.3V(SU)
C111	ECSF1AE476	Tantalum 47 µF 10V
C112	ECEA0JS221	Electrolytic 220 µF 6.3V
C114	ECEA1AU470	Electrolytic 47 µF 10V
C115	YF400101CHJT	Ceramic 100 pF
C116	ECEA1AU470	Electrolytic 47 µF 10V
C118	YF400271SLKT	Ceramic 270 pF
C119	ECEA1HU2R2	Electrolytic 2.2 µF 50V
C120	ECEA1AN470S	Electrolytic 47 µF 10V
C121	ECEA0JU220	Electrolytic 22 µF 6.3V
C123	YF426104DMS	Ceramic 0.1 µF 50V
C300	YF400271CHJT	Ceramic 270 pF
C301	YF400820CHJT	Ceramic 82 pF
C303	ECSF0JE476	Tantalum 47 µF 6.3V
C305	ECSF1AE476	Tantalum 47 µF 10V

REF.NO.	PART NO.	DESCRIPTION
C306	YF400151CHJT	Ceramic 150 pF
C307	ECSF1AE335	Tantalum 3.3 µF 10V
C308	YF400101CHJT	Ceramic 100 pF
C309	YF400271CHJT	Ceramic 270 pF
C310	YF426104DMS	Ceramic 0.1 µF 50V
C500	YF400101CHJT	Ceramic 100 pF
C501	ECSF1AE226	Tantalum 22 µF 10V
C504	ECCF1H680JC	Ceramic 68 pF 50V
CT1	ECRLA010A12	Trimmer Capacitor 10 pF
L1	ELESQ4R7KA	Coil 4.7 µH
L2,4	ELESQ2R2KA	Coil 2.2 µH
L5,6	ELESQ2R2KA	Coil 2.2 µH
L7	ELESQ221KA	Coil 220 µH
L8	YFVC101J	Coil 100 µH
L9	ELESQ2R2KA	Coil 2.2 µH
L10	ELESQ4R7KA	Coil 4.7 µH
L11	ELESQ101KA	Coil 100 µH
L12,13	ELESQ2R2KA	Coil 2.2 µH
L15	ELESQ2R2KA	Coil 2.2 µH
L16	ELESQ270KA	Coil 27 µH
L18	ELESQ221KA	Coil 220 µH
L19	ELESQ2R2KA	Coil 2.2 µH
L20	YWVL5026	Coil 1 µH
L21	YFL51R0J	Coil 1 µH
L22	ELESQ2R2KA	Coil 2.2 µH
L23	ELESQ221KA	Coil 220 µH
L25	ELESQ2R2KA	Coil 2.2 µH
L27	ELESQ270KA	Coil 27 µH
L30-32	SP0305R68M2	Coil 0.68 µH
L50	SP0305R68M2	Coil 0.68 µH
T1	ETE13K46BY	Flyback Transformer
SW1	YWSSSU122L6N	Slide Switch
SW2	YWSSSU122L6N	Slide Switch
X1	YWKD5720NCA	Crystal Oscillator
CF1	YWELB4K076	Filter
CF2	ELB4N027	Filter
CF3	ELB4L072	Filter
CF6	YFSLC821683	Filter
F1	YFSP71A	Current Fuse
J12	YF21160R00T	Jamper Resistor
J78	ERJ8GCS0R00	Jamper Resistor
J502	YF21160R00T	Jamper Resistor
CN1-JM	EMCS0250Z	2 pin Jack Male
CN2-JM	EMCS0450Z	4 pin Jack Male
CN3-JM	EMCS0750Z	7 pin Jack Male
CN4-JM	EMCS1050Z	10 pin Jack Male
M61	YWV2HA0486A4	Shield Parts
M62	YWV7DA0172A4	Heat Sink

POWER BOARD

REF.NO.	PART NO.	DESCRIPTION	
PCB5 (NLA)	o YWD4001E	Printed Circuit Board Assy	
IC1	YWSTR11006-S	IC	
Q1-3	2SC2001-K	Transistor	
Q4	2SC945-PQ	Transistor	
D1	YWD2SB60	Diode	
D2	RU1P	Diode	
D3	1SS55	Diode	
D4,5	1SS133	Diode	
D6	1SS55	Diode	
D7	YWERA81-004	Diode	
D8	1SS55	Diode	
D10	YWSV03YS	Diode	
D11	YW10E1N	Diode	
D12	TW10E-6	Diode	
D13	YWD4SC6M	Diode	
D14	RD6.2EB1	Diode	
D15	1SS55	Diode	
D16	YWRD5.6EB1	Diode	
PC1,2	ON3105	Photo-Couple	
R1	ERF-5TLJ5R6	Cement	5.6 ohms 5W
R2,3	ERD50FJ334	Carbon	330K ohms 1/2W
R4,5	ERG2ANJ683	Metal	68K ohms 2W
R6	ERDS2TJ101	Carbon	100 ohms 1/4W
R7,8	ERG1ANJ560	Metal	56 ohms 1W
R9	ERD50FJ100	Carbon	10 ohms 1/2W
R10	RNF1PR39K	Metal	39K ohms 1W
R12	ERDS2TJ471	Carbon	470 ohms 1/4W
R13	ERDS2TJ152	Carbon	1.5K ohms 1/4W
R14	ERDS2TJ102	Carbon	1K ohms 1/4W
R15	ERG3ANJ273	Metal	27K ohms 3W
R17	ERDS2TJ101	Carbon	100 ohms 1/4W
R21	ERDS2TJ122	Carbon	100 ohms 1/4W
R22	VZ067TL1B202	Variable Rasistor	2K ohms
R23	ERDS2TJ222	Carbon	2.2K ohms 1/4W
R24	ERDS2TJ122	Carbon	1.2K ohms 1/4W
R25	ERDS2TJ681	Carbon	680 ohms 1/4W
R26	ERDS2TJ332	Carbon	3.3K ohms 1/4W
R27	ERG1ANJ331	Metal	330 ohms 1W
R28	ERDS2TJ222	Carbon	2.2K ohms 1/4W
C1	YWXE224	Plastic	0.22 µF 250V
C2	YWXE104	Plastic	0.1 µF 250V
C3,4	YWDE710F222M	Ceramic	2200 pF
C5	ECES2GG101R	Electrolytic	100 µF 400V
C6	UIT2HR47TRA	Electrolytic	0.47 µF 500V
C7	ECQV1H153JZ	Polyester	0.015 µF 50V
C8	ECQV1H682JZ	Polyester	6800 pF 50V
C9	ECQV1H473JZ	Polyester	0.047 µF 50V
C10,11	ECEA1CGE100	Electrolytic	10 µF 16V
C12	ECEA1HGE4R7	Electrolytic	4.7 µF 50V
C13	ECEA1CGE101	Electrolytic	100 µF 16V
C14	ECQV1H473JZ	Polyester	0.047 µF 50V
C16,17	ECKDNS472ME	Ceramic	4700pF
C19	ECEA1HGE010	Electrolytic	1 µF 50V
C20	YWDE705B101K	Ceramic	100 pF
C21	ECEA1CGE222	Electrolytic	2200 µF 16V
C22	ECEA1CGE102	Electrolytic	1000 µF 16V
C23	ECKD2H102KB	Ceramic	1000pF 500V
C24	ECQV1H104JZ	Polyester	0.1 µF 50V
C25	ECQV1H332JZ	Polyester	3300 pF 50V
C26	ECQV1H104JZ	Polyester	0.1 µF 50V
L1	o ELF18D210	Line Filter	
L2	oYWSN-12-500	Choke Coil	
T1	o YWPT-P36-KT	Switching Transformer	
F1 ⚠	XBA2C20ET0A	Fuse	2A 250V
F2 ⚠	YWX23	Thermo Fuse	
E1 ⚠	YFPU51212	Fuse Holder	
E2	YWTM028	Tarminal pin	
CN1-JM	EMCS0452M	4 pin Jack Male	
CN2-JM	EMCS0250	2 pin Jack Male	
M65	o D4001-5001B	Heat-Sink A	
M66	o D4001-5002A	Heat-Sink B	
M67	o D4001-5003A	Heat-Sink C	
M68	o YW90F3037B01	Insulater Sheat	
M69	o D4001-6001A	Warning Label	

TERMINAL BOARD

REF.NO.	PART NO.	DESCRIPTION	
PCB6	o YWVRY810NE1A	Printed Board	
C2	ECKF1H102KB	Ceramic	1000 pF 50V
L1-3	SP0305R68M2	Coil	
CN1-3JM	EMCS0250Z	2 pin Jack Male	

ALC BOARD

REF.NO.	PART NO.	DESCRIPTION
PCB7	o YWVRZ811NE1A	Printed Board
L1-4	SP0305R68M2	Coil
CF1-4	YWB20L44	Filter

ACCESSORY PARTS/PACKAGING PARTS

REF.NO.	PART NO.	DESCRIPTION
M51	o YWV8QA1565AN	Operating Instructions
M52	XZB35X50C05	Polyethylene Bag
M53	YWT10X35C03	Polyethylene Bag
M54	YWT20X25C03	Polyethylene Bag
M55	o YWV9CB1008AN	Packaging
M56	YWV8FA0140A4	Packaging Label